The Planter

Add Tenac – and rain won't wash away your spray.

Don't let rain waste your money. Mix only one pint of Tenac Sticker to a hundred gallons of spray mixture, and you prevent washout. And increase effectiveness. Whether it's a weedkiller, an insecticide, or a fungicide, Tenac increases the spray's sticking power. Increases residual life. Improves economy. For supplies, call your nearest Shell Chemicals dealer.



The Planter

KDN 5761

MAGAZINE OF THE INCORPORATED SOCIETY OF PLANTERS

VOL. 49 JANUARY 1973 No. 562

MEMORIAL TUN ABDUL RAZAK
PR(PTR)
44
MALAYSIA.

Publishing Office :

1 Pesiaran Lidcol
P O Box 262
Kuala Lumpur 04-06
MALAYSIA

Telephone : 86396

Telegrams : ISPLA

Price : M$2.50

Annual Subscription : M$30.00

Editorial Committee

W Newall (*Chairman*)
D A Earp (*Editor/Manager*)
B C Stone PH D
R L Wastie M A PH D (*Technical Editor*)

N O T E

The Planter assumes no responsibility for the statements and opinions expressed by contributors.

SENTIASA MAJU

The Incorporated Society of Planters

Founded 1919

THE SOCIETY REPRESENTS the Planters of Malaysia and other territories, whose personal and professional interests it is bound to endeavour to secure and promote.

OBJECTS foremost in the Society's Memorandum of Association are:

To promote the general interests of the planting profession.

To promote the advancement and facilitate the acquisition of that knowledge which constitutes the professional qualification of planter.

To watch over, promote and protect the mutual and individual interests of its members in respect of matters pertaining to or arising from their employment in the planting profession.

To promote and maintain good feeling, co-operation and understanding between members and their employers.

ACHIEVEMENTS of the Society are a technical education scheme, the publication of authoritative works on tropical agriculture, a monthly magazine featuring original technical articles, the sponsorship of conferences and symposia on tropical crops, and the organisation of joint consultation with employers.

MEMBERSHIP of the Society is open to: —

A Those directly employed in plantation management such as estate managers, assistant managers, superintendents, supervisors and cadets, and

B Executive engineers, estate medical officers, and qualified scientific or administrative staff of estates or organisations mainly concerned with the planting industry.

Category B may include those employed in such other senior executive, administrative, professional or advisory capacities as may be deemed by the Executive Council as being equivalent thereto

Neither category shall include clerks, conductors, hospital assistants, etc.

ENTRANCE FEE for new and rejoining members is $10/- and must accompany application.

ANNUAL SUBSCRIPTION RATES are as follows: —

	During the calendar year in which eligibility for membership occurred and the 4 succeeding calendar years.	Subsequently.
Category A		
Ordinary Members employed as Managers, Assistant Managers etc. and normally resident in:		
Malaya and Singapore	$ 48	$ 78
East Malaysia and Brunei	$ 44	$ 60
Category B		
Ordinary Members employed as Executive Engineers, Estate Medical Officers, Research Staff etc., wherever resident	$ 48	$ 48
Approved Overseas territories	$ 44	$ 44

Contents

January 1973

Page

Editorial

The Technical Planter - 1

Technical

Some observations on South American Leaf Blight in South America — *B Sripathi Rao* — 2

Severe boron deficiency in young oil palms in Sumatra — *A Y L Purba & P D Turner* — 10

Conservation in Malaysia Part Six — Threatened Species — *P R Wycherley* — 30

The Society's Technical Education Scheme - 14

A Guide for examinees - 27

General

The monthly crop - 51

Energy: 1985 and beyond — *Peter G Peterson* — 53

Ecologically ideal industry - 56

Appointment vacant - 59

Officers - 63

Social and Personal - 60

Pudina Mutton - 64

I. S. P.

Technical Education Scheme

In this and the next issue of "The Planter" may be found full details of the Society's Scheme for the Technical Education of its members.

Would-be candidates are asked to preserve these copies as a permanent source of all necessary information on the various examinations. By so doing they will be greatly assisting the Society and obviating the constant need for writing to individual members with replies to their questions about the Scheme.

Editorial :

The Technical Planter

Nobody can deny the importance of examinations. All professions have their own standards of efficiency, whether it be Certificate, Diploma or Degree. Most employers have for many years stressed the importance of the Society's Technical Education Scheme (TES) examinations, and an assistant manager's advancement can be partially related to his progress in these, designed as they are to sort out those who know and have worked at the subject, and those who do not and have not.

The various examinations set under the TES are dealt with in detail in this and a succeeding issue. In recent months the pass rate in these examinations has been moderate at best, while in some there has been a disturbing level of failures. Examiners' comments reveal a dismaying unanimity: 'lacks a basic grasp of the subject', 'ill-prepared for the examination'.

A most useful guide for those studying for the Society's examinations was published some 10 years ago in this magazine. With slight modifications, which have in no way blunted its salient points, the guide is reproduced in this issue.

There is evidence to suggest that most planters now join the ISP principally to sit for its examinations. Success in these helps their chances of advancement and often brings immediate and tangible rewards from the employer. It has to be emphasised therefore that there is no quick or easy way to pass these examinations and that if our newer members are to avoid early disenchantment with both the TES and their own ability they should pay earnest heed to the advice contained in the following pages.

The examinations are not going to get any easier just because most candidates make a poor showing in some of them. There is no quota system of passes as is sometimes used in very large examinations. The integrity and standards of the TES are among the most cherished of the Society's achievements, and there can be no compromise. We urge our younger members to meet the challenge of these examinations and strive for success in them.

It cannot be proved that a planter who holds the Society's Associateship Diploma is better at his job than one who does not, but there is more than just a strong possibility that he is just that!

Planter, Kuala Lumpur **49:** 2–9 (1973)

Some observations on South American Leaf Blight in South America

B. SRIPATHI RAO*

South American Leaf Blight caused by *Microcyclus ulei* is the most destructive disease of para rubber, and has been largely responsible for the absence of a viable natural rubber industry in tropical America. A visit to Brazil and Trinidad in March 1972 gave the author an opportunity to see the ravages of the disease and make some observations of interest to this region, which it is hoped will make planters more aware of its potential threat to the natural rubber industry in Malaysia.

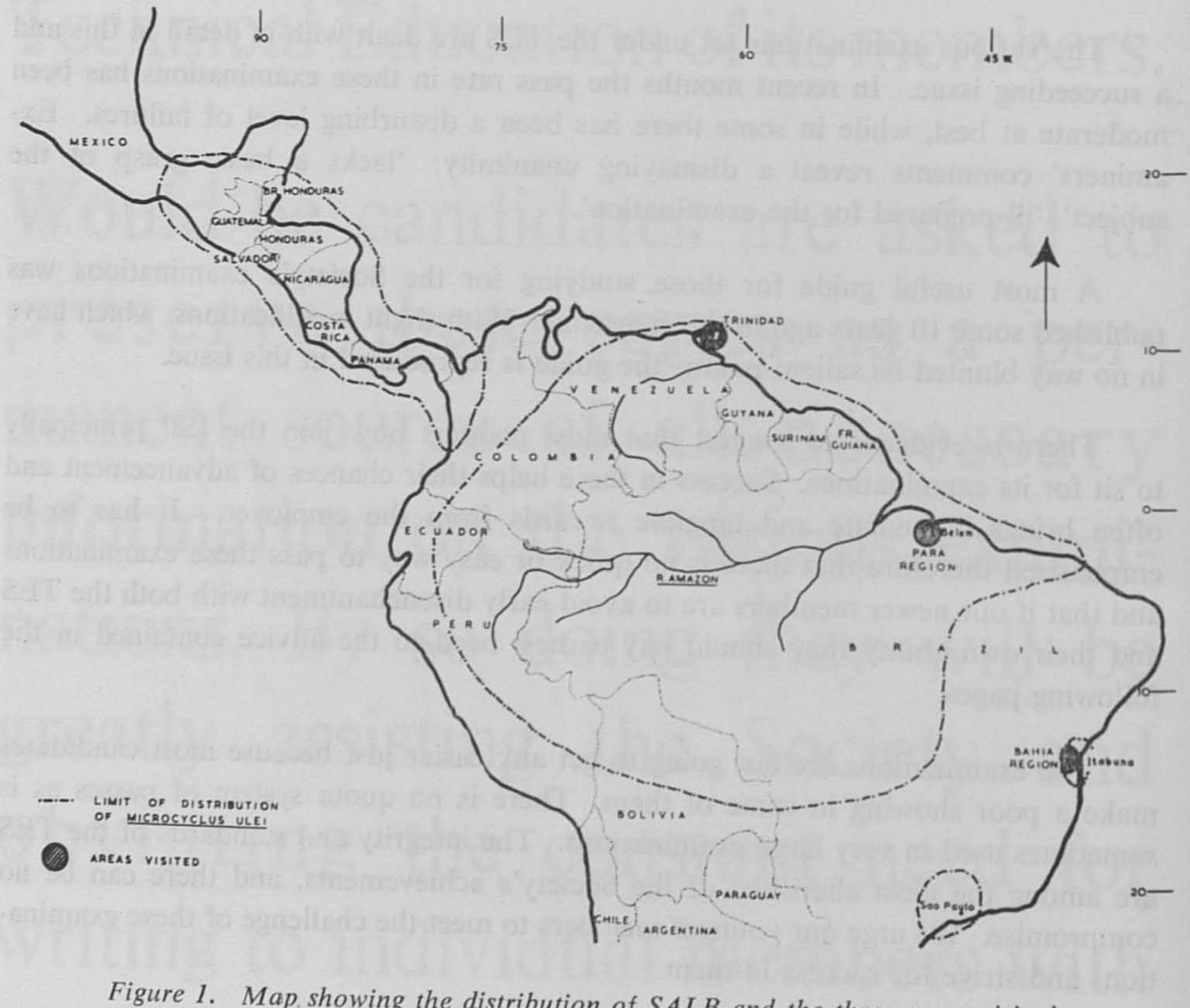


Figure 1. Map showing the distribution of SALB and the three areas visited.

Though SALB can affect all green parts and flowers of *Hevea brasiliensis*, the most susceptible are pendant leaflets 4–9 days old. The fungus appears in the form of dull velvety lesions, generally on the lower surface, which get covered with olive-

* Rubber Research Institute of Malaya, Kuala Lumpur

green sporing masses. The leaflets crinkle, shrivel and blacken before dropping. Surviving leaflets become ragged and shot-holed and develop the secondary stage of the disease—round black bodies arranged around the margin of the holes in a series of rings on the upper surface. Repeated defoliation results in the dieback of green shoots and ultimately in the death of the tree. The age of the tree determines the rapidity with which these symptoms occur. Fungicidal control has been found practicable in nurseries and young plantings, and in such situations weekly spraying of a dithiocarbamate fungicide is practised. In mature plantations, however, the disease is similar to our secondary leaf fall (SLF) in that it occurs during refoliation after wintering, but it is much more destructive and its effect on the trees is much worse than Oidium or Gloeosporium SLF.

As with SLF, a strong effect of the climate on the severity of the disease was noticed in the three rubber-growing areas visited: Trinidad in West Indies, and the Belem (Para region) and Itabuna-Una (Bahia region) areas in Brazil.

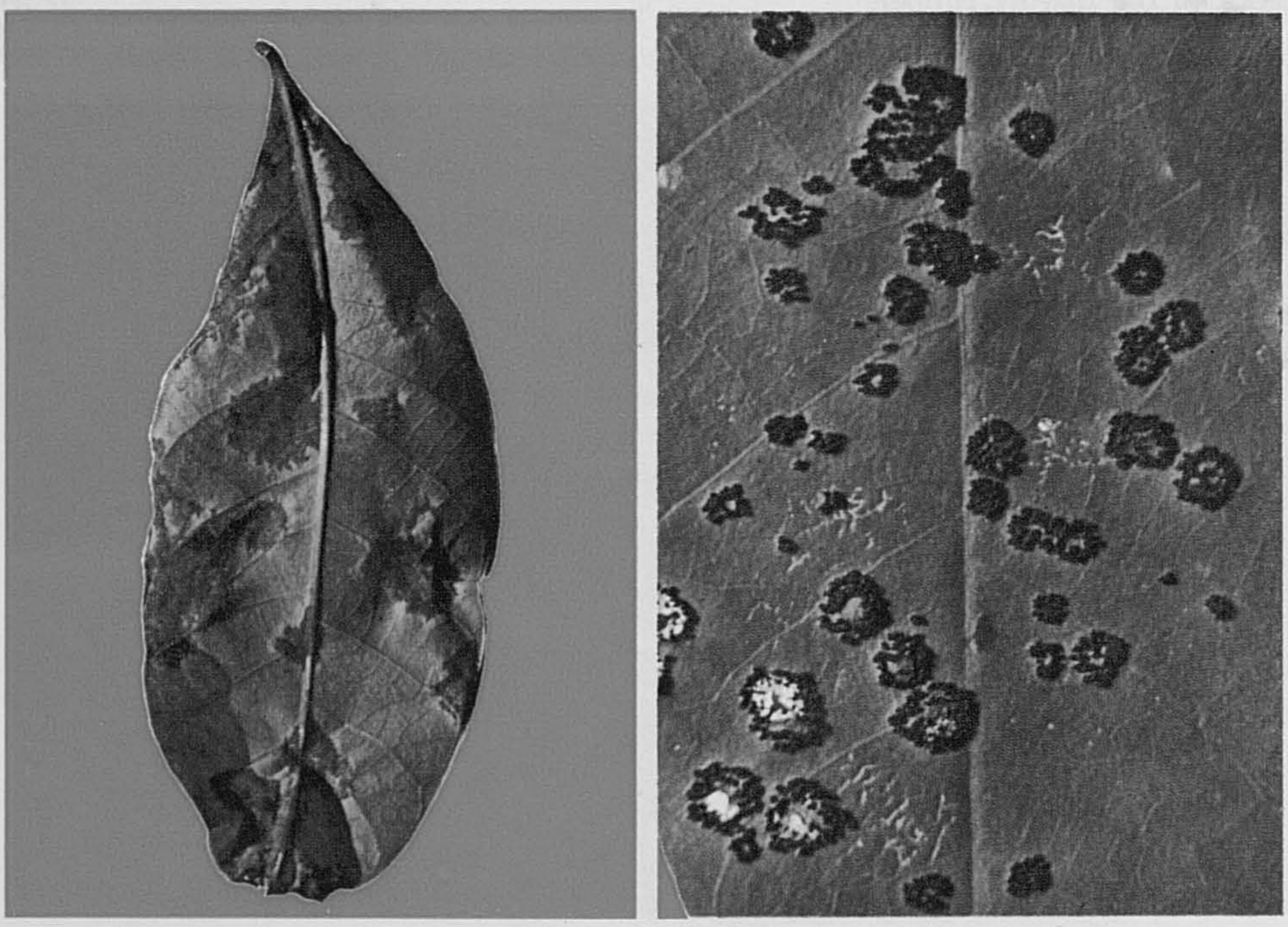


Plate 1. Primary (left) *and secondary* (right) *stages of South American Leaf Blight.*

TRINIDAD

The small amount of commercial rubber existing in the island was planted before 1914, and is situated in the northern part of the island; scattered patches of similar rubber occur elsewhere, but are abandoned. The annual rainfall in these parts is 250–280 cm, with a marked dry season of 4 months between February and May.

Wintering and subsequent refoliation occur at the beginning of the dry season, with the result that the trees escape the disease. A light infection is sometimes noticed on the lowermost branches, but hardly any defoliation results, and a full canopy is retained throughout the year. Nevertheless, the numerous volunteer seedlings growing under bush conditions among heavy weed growth are severely affected and exhibit a full range of symptoms, from leaf distortion to complete death. The survivors are weak and carry a few small shot-holed leaves. Pendant leaves of vigorous young shoots developing from pollarded stems were excellent examples of the severity of the disease.

A disease-screening nursery established 10 years ago in the farm of the University of the West Indies was considerably affected, particularly in a crowded block of overgrown seedlings which had been repeatedly cut back. On the other hand, in the RRIM Field Station 50 km away, established 3 years ago, the disease has only just started to appear on scattered seedlings; it is most likely to increase because of the presence of heavily-infected volunteer seedlings under an adjacent block of old mature rubber.



Figure 2. A leaf severely infected with SALB in a nursery in Trinidad.

BELEM

The laboratories and field station of the Instituto de Pesquisas e Experimentacao Agropecuarias do Notre (IPEAN), which took over the pioneering work of breeding for resistance from Ford in 1946, are situated on the outskirts of the city of Belem close to the equator. There are two large commercial estates within 100 km of the city.

The annual rainfall—about 250 cm at the IPEAN and in the estate closer to it, and 350 cm in the other estate—is distributed throughout the year with no dry season, but two-thirds of it occur from January to May. Wintering and refoliation take place in June/July when the weather is still wet and is thus ideal for the development of the disease. Therefore, in addition to its presence in nurseries and young plantings throughout the year, it also causes severe SLF on mature trees; such trees repeatedly put forth new flushes to replace those lost by the disease, only to be defoliated again. The process may be repeated three or four times a year, with each succeeding batch of flushes being fewer in number and smaller in size. The trunk and branches of trees thus weakened become heavily covered with moss, and the surviving leaves are severely shot-holed, with secondary attacks by the fungus *Catacauma huberi* causing the characteristic black crust.

An interesting observation on the first estate was the severity of the disease noticed on IAN 717, a clone which is one of the resistant half-dozen generally planted in Brazil. Eight- and 10-yr-old stands appeared half their age in growth, with antler-like shoots bearing sparse or no foliage. The young leaves produced on scattered trees attempting to refoliate were diseased and dropping, and some trees were dead or dying as a result of repeated defoliation. Similarly, the formerly resistant clone FX 3899 is beginning to show considerable susceptibility to the disease. An 8-yr-old stand of top-budded RRIM 600 looked extremely poor and has been abandoned. The soil on this estate is hard lateritic which is unsuitable for root development, and fertilizers are not generally applied.

On the second estate, among mixed plantings of a number of clones, including FX and IAN series, which were established in the early 1960's, only IAN 717 and FX 3899 retained some foliage (about 40–50%) while all the others were either leafless or bore only 10–20% canopy. The original plantings are being interplanted with FX 3899, whereas younger plantings are being top-budded with IAN 717. *Hevea pauciflora* is resistant, but crown-budding with it has resulted in a yield depression of almost one third.

Nurseries at the IPEAN are attacked by both SALB and target leaf spot (*Pellicularia filamentosa*) which is the second most important leaf disease of rubber in Para. Trees growing in small isolated groups were observed to be free from SALB. On land bordering river banks, subjected to flooding two or three times a year, highly susceptible oriental clones can be grown, and a reasonably good canopy and yield obtained. This is explained by the higher nutrient status of the soil, which is enriched by silt deposited by the floods.

ITABUNA - UNA

There are many commercial rubber plantations in the state of Bahia at latitudes 14°–15°S. The annual rainfall of about 200 cm is well distributed throughout the year, but September and October have slightly less rain than other months. Wintering occurs in July/August and if refoliation occurs during dry weather certain clones escape the disease.

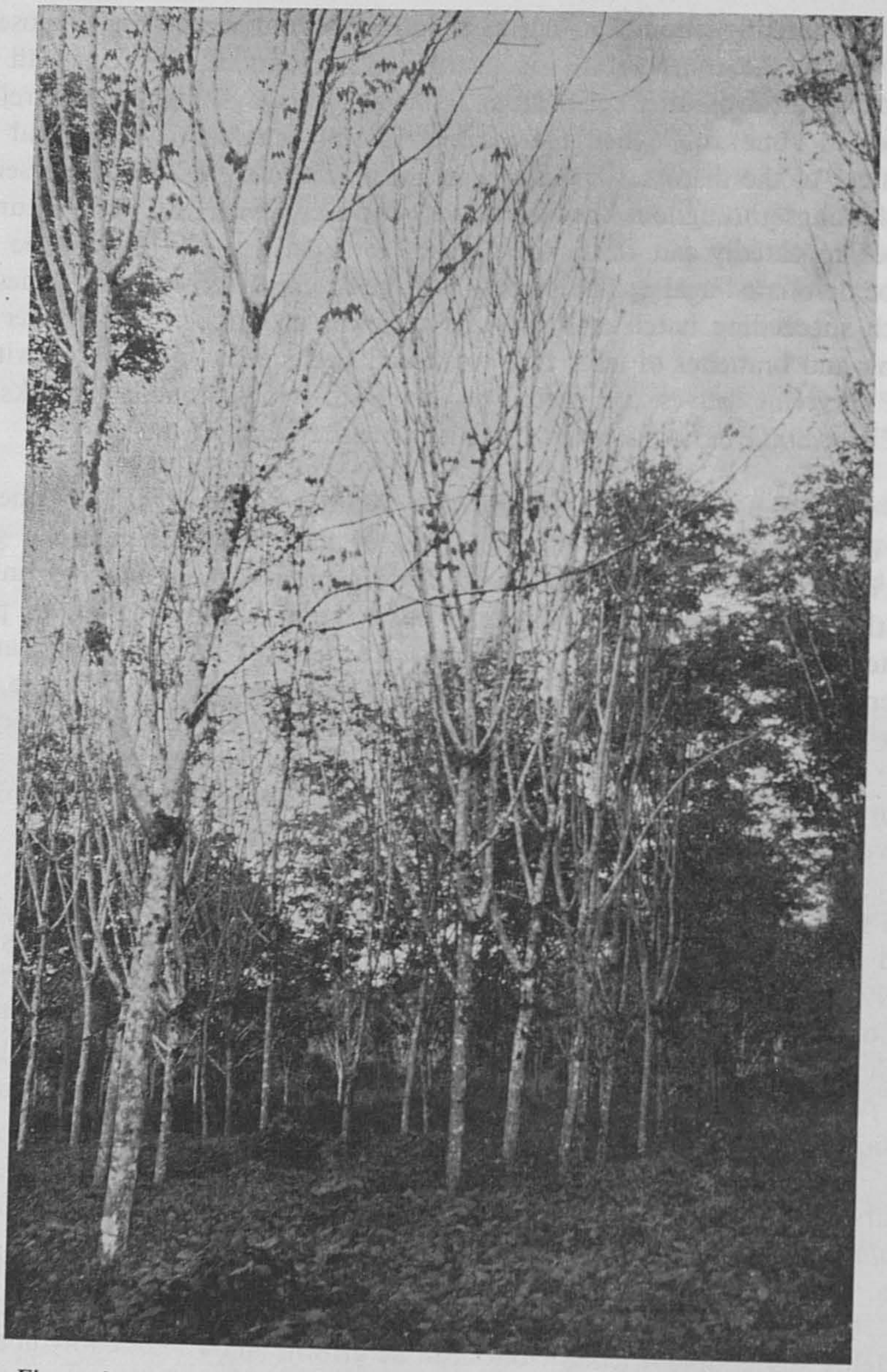


Figure 3. A field of the clone IAN 717 in Belem defoliated by SALB.

The worst affected clone in this region is FX 25, the resistance of which was first noticed to break down in 1964 at 8 years of age. Large acreages of it are now either leafless or abandoned. On the other hand, IAN 717 appears healthy, and is being planted in place of FX 25 or crown-budded on it. The contrast between abandoned FX 25 and the thick foliage of IAN 717 and FX 2261 of the same ages growing adjacent to each other was striking. Another difference was the presence on the trunk of most FX 25 trees of large bulb-like termite nests, indicating dieback of shoots and anticipated death. Even IAN 717 succumbs to the disease in certain

places, while looking healthy elsewhere in the same field. About one-third of the stand of 8-to-9-yr-old rubber on one estate appeared as bad as the trees observed at Belem. This may be due to differences in the time of refoliation after wintering or to nutritional factors.

On the largest estate in the region, covering about 2 500 hectares, many clones have come to maturity—FX 25, FX 2261, FX 3925, FX 516 and IAN 717—but very few retain their original resistance. The policy of routine fertilizer application for young rubber and the high standard of maintenance perhaps explain why many mature fields, including FX 25, continue to yield satisfactorily. FX 3899 appears to be resistant, and FX 3864 was chosen for planting in 1972. The estate does not plant the same clone over large areas; different clones are chosen each year so that at least a part of the estate would survive in the event of any large-scale breakdown in resistance. Another observation made on the same estate was the striking difference in disease severity between low-lying areas or pockets among hills (where it was severe), and the higher reaches of hill slopes, where the trees had a thicker canopy.

Fungicides were applied experimentally from the air to 150 hectares of rubber in 1971 by CEPLAC*, and in 1972 they were planning to artificially defoliate the trees in chosen areas in order to avoid the disease. Fertilizer experiments were also planned to rehabilitate much of the FX 25 which would otherwise be abandoned, as it is clear in many places that soil factors are involved in disease susceptibility.

CONCLUSIONS

The existence of many differentially distributed races of the fungus makes disease screening meaningless if confined to any one area, except against the race or races occurring at that point. The so-called breakdown in resistance noticed in recent years has been attributed to the development of new races of the fungus, but one cannot ignore the vastly different micro-climate in the nursery where selection is made, and in the mature stand with susceptible new foliage emerging all at once after wintering. Brazilian pathologists are convinced that nursery screening alone is of limited suitability for determining the response of clones to infection, for the actual degree of resistance is shown only in field plantings.

The incidence and intensity of SALB are not related so much to the total yearly rainfall as to its distribution: where rainfall is distributed throughout the year severe attacks of the disease are more likely than in an area of heavy rainfall but with a marked dry season. Even where all twelve months are wet, a dry spell of 2–3 weeks during refoliation reduces the importance of the disease. Considerable interest was therefore shown in the Bahia region for controlled wintering by chemical defoliation, a technique developed in Malaysia for avoiding SLF. There is, in fact, a country-wide programme in Brazil to select areas having a marked dry season and which are therefore suitable for the future expansion of rubber cultivation.

---

* Comissao Executiva do Plano de Recuperacao Economico-Rural da Lavoura Cacaueira



Figure 4. Rows of test clones contrasted with a row of the resistant Hevea spruceana *in Belem.*



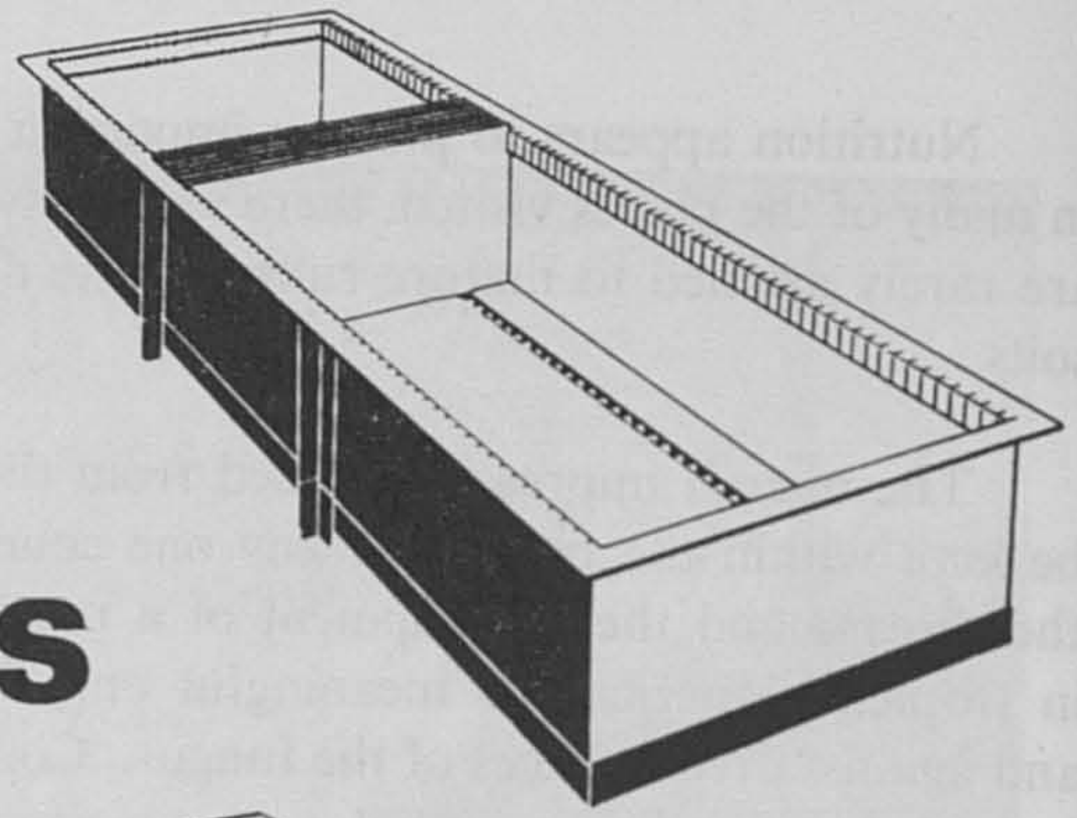
Figure 5. Aerial view of a plantation near Una showing the clone FX 25 breaking down resistance to SALB in extending patches.

Nutrition appears to play an important role in increasing disease susceptibility. In many of the places visited, there was no systematic application of fertilizers, which are rarely applied to mature rubber. The disease was particularly severe in poorer soils.

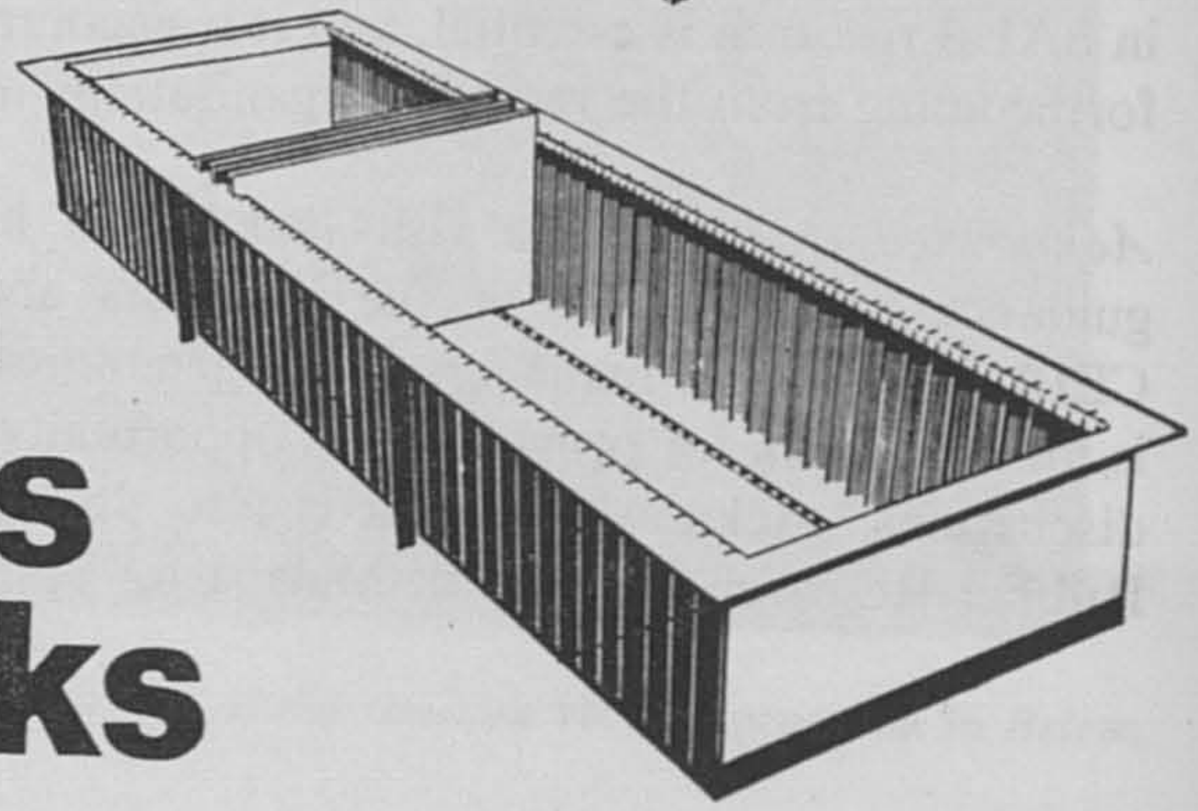
The overall impression gained from the visit is that research on SALB cannot be kept within the bounds of any one country. Research into the epidemiology of the disease and the development of a more realistic approach to disease screening in tropical America are meaningful only if carried out in many climatic regimes and against diverse races of the fungus. Collaboration between the institutes engaged in SALB research is essential, and it is encouraging that offers of collaboration were forthcoming from the research organisations in Brazil.

Acknowledgements. The visits would not have been possible without the help, guidance and kindness of the Directors and research workers of IPEAN and CEPLAC, and the managers of the plantations visited. Grateful acknowledgement is made to them for providing this opportunity to see the disease and to benefit from discussions. Acknowledgement is also due to the Director and the Board of the Rubber Research Institute of Malaya for approving and financing the visits.

DCL all-aluminium separate sheet tanks



DCL all-aluminium continuous sheet tanks



5 reasons you should use an all-aluminium coagulating tank.

1 No upkeep is required; periodical painting and repairs are eliminated.

2 No woodwork to warp or rot; storing for any length of time without deterioration at all.

3 Easy cleaning.

4 Non-corrosive, unaffected by chemicals used for latex.

5 Cheaper in the long run.

DIETHELM & CO. LTD.

Petaling Jaya: Jalan University, P.O. Box 77, Tel. 52675
and offices at Ipoh, Penang, Malacca, Kota Bharu and Singapore.

Planter, Kuala Lumpur **49:** 10–13 (1973)

Severe boron deficiency in young oil palms in Sumatra

A. Y. L. PURBA* & P. D. TURNER†

In recent months, widespread symptoms of boron deficiency have been observed in at least five estates in North Sumatra and in another in South Sumatra. Severity of symptom expression ranges from mild to very severe. The distribution of affected palms is also very variable. Sometimes, a single palm only in a group will be very badly affected, those around showing no deficiency symptoms, or perhaps an occasional indication of incipient deficiency, whilst in other instances groups of palms are affected. Palms have usually been 4–5 years old, although slightly older palms sometimes also show symptoms. In the latter case, these have been under-planted beneath old oil palms, receiving a severe growth check, so that in terms of developmental age they fall into the same category as the remainder. There can be no doubt that palms severely affected by the deficiency are very markedly retarded in their development, being much smaller than neighbouring unaffected palms, since the amount of photosynthetic tissue is drastically reduced. The adverse effects on vegetative development would be expected to have concomitant influence on yields, so this deficiency disease is definitely one of economic significance.

Most of the symptoms which have been attributed to boron deficiency are present on the estates. These have been described fully elsewhere (Turner & Bull, 1968) and include hook leaf in its various forms, ranging from mild to severe, bristle tip, rounded frond tip, blind leaf and fish bone leaf. The high incidence and the range of symptom severity have been useful in indicating those symptoms which appear to represent incipient deficiency and those representing a condition of severe deficit. Slight hook leaf has long been suggested to be a symptom of incipient boron deficiency, but since this symptom also occurs on palms in which subsequent foliar nutrient analysis has shown the boron levels to be high, the possibility of other causes of slight hook leaf must be considered possible. Severe hook leaf, however, together with the associated pinna malformations, is normally a symptom of a severe boron deficit. Very useful indicators of incipient deficiency are the symptoms of blind leaf (where this is not of genetic origin) and particularly bristle tip, which were noticed on several occasions on palms showing no other symptoms. One of the most useful symptoms of severe deficiency in young palms is that of fish bone leaf, in which the size and length of the pinnae are severely reduced. This symptom is very useful in areas where damage by *Oryctes* beetle might be confused with boron deficiency; severe frond malformation and little leaf symptoms are found in both instances, but beetle attack does not result in the fish bone symptom.

The speed with which leaf malformation occurs in young palms is quite rapid (*Figs. 1 & 2*), with a quick progression from normal rachis and pinna formation

* Perusahaan Negara Perkebunan VI, Pabatu, Tebing Tinggi Deli, Sumatra Utara.

† Harrisons Fleming Advisory Services, London EC3R 5AB.

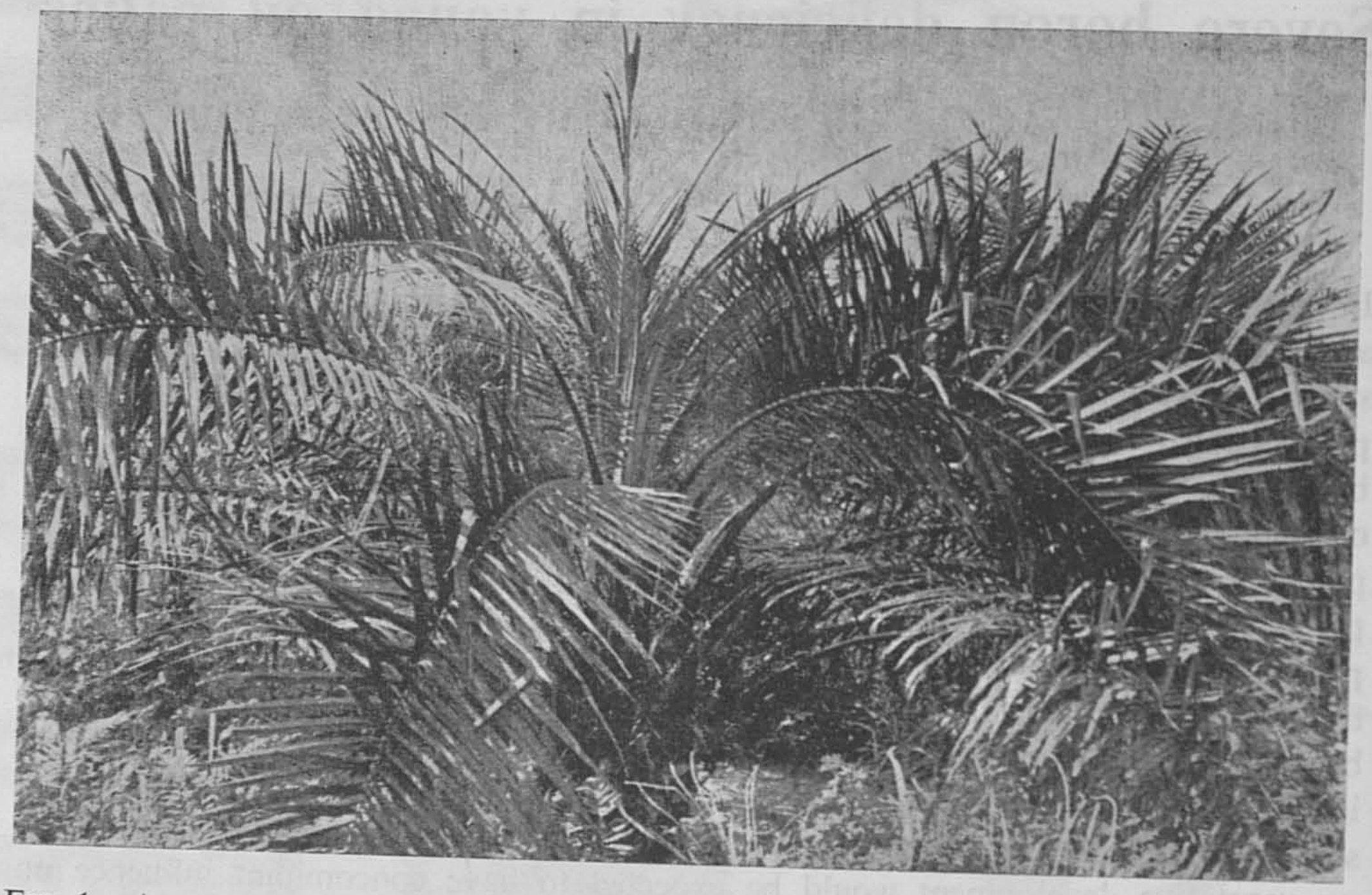


FIG. 1. A young palm, showing the rapid progression from normal frond production to severely affected fronds as a result of boron deficiency.



FIG. 2. Leaf malformations in a young palm as a result of severe boron deficiency.

through hook leaf and fusion of adjacent malformed pinnae and the fish bone leaf symptom to the final production of a rachis stump, or 'stump leaf' (Turner & Bull, 1968; Rajaratnam, 1972). At the same time, abortion of both inflorescences and developing fruit bunches frequently occurs. If an affected palm is split, dark discolouration is found in the region of the apical meristem (*Fig. 3*).

Affected fields are those where palms are grown on loams or sandy loams. Similar plantings on coastal clay soils have not been seen to be affected, and this is in keeping with the general hypothesis that boron reserves and availability are normally greater in the latter soil type. In all instances where a severe deficit has occurred, the young stand is in an area which has previously been cultivated, having usually replaced an old oil palm stand. As far as can be determined, the old stand never received boron fertiliser. In some instances, boron leaf analysis in stands close to the young affected palms have shown levels as low as 4–5 p.p.m. in frond 17. The anomaly here is that although levels such as these would be expected to lead to quite severe foliar symptoms, these are frequently completely, or almost completely, absent.

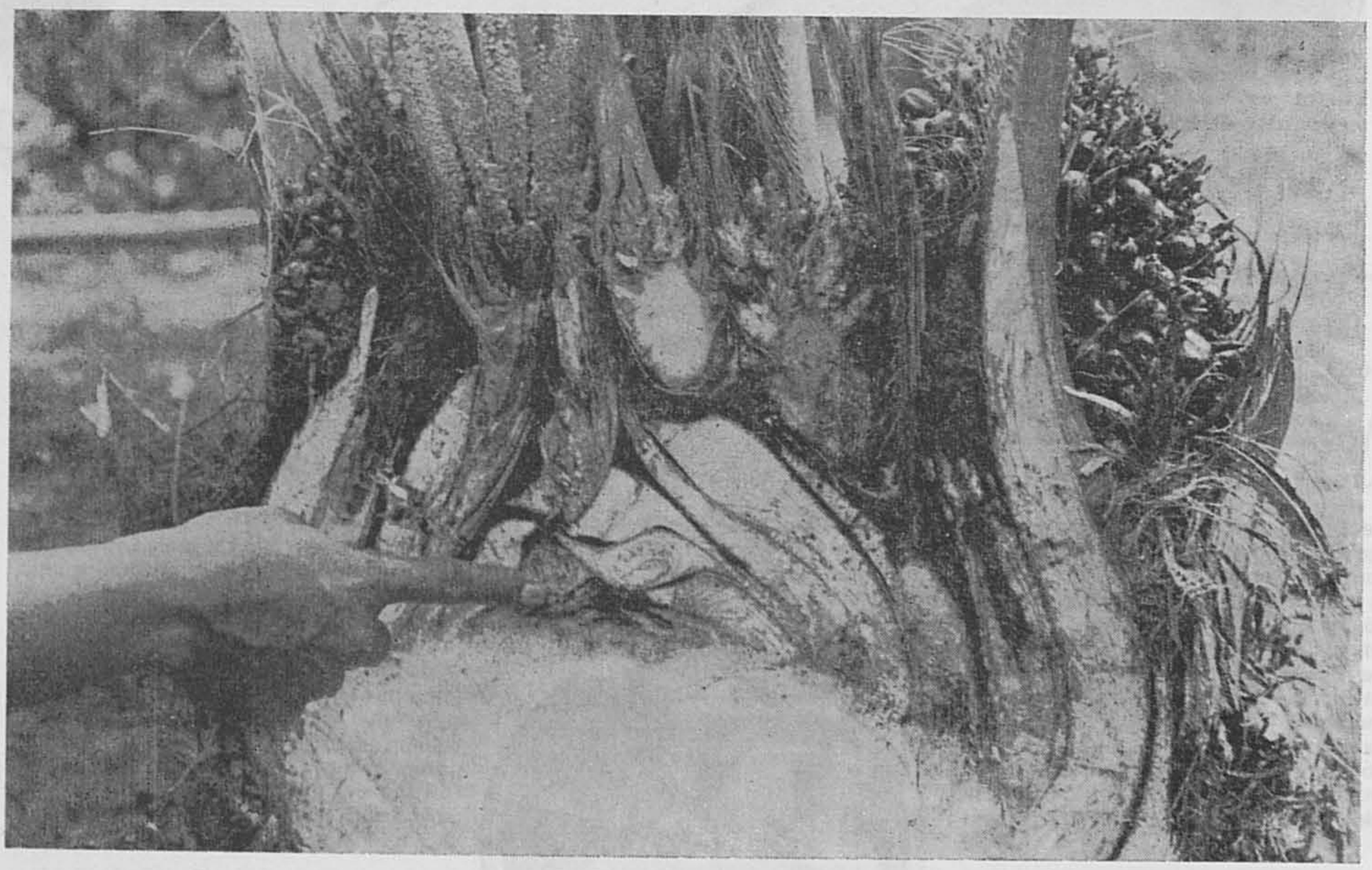


FIG. 3. Discolouration in the region of the apical bud in a young palm showing symptoms of severe boron deficiency.

The cause of the deficit in the young plantings would appear to be two-fold. In the first instance, previous cultivation would seem to have resulted in a shortage of natural soil boron reserves for the young palms. Since boron has an important function in the apical meristem, the very active vegetative development of young palms in relation to their size would point to a high requirement during the early years of growth. Secondly, recent applications of fertiliser have been much higher

Holden The Great Way to Move

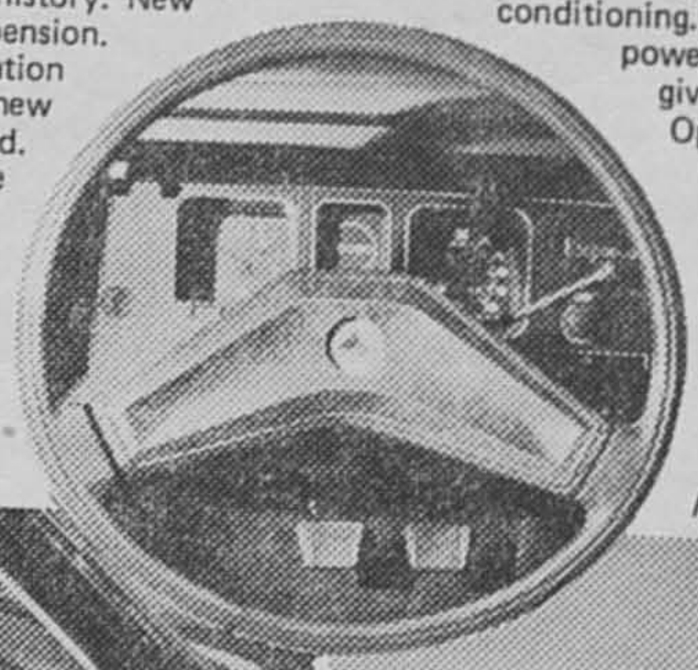


"Sydney Sun"
Road Test reports
on fuel consumption

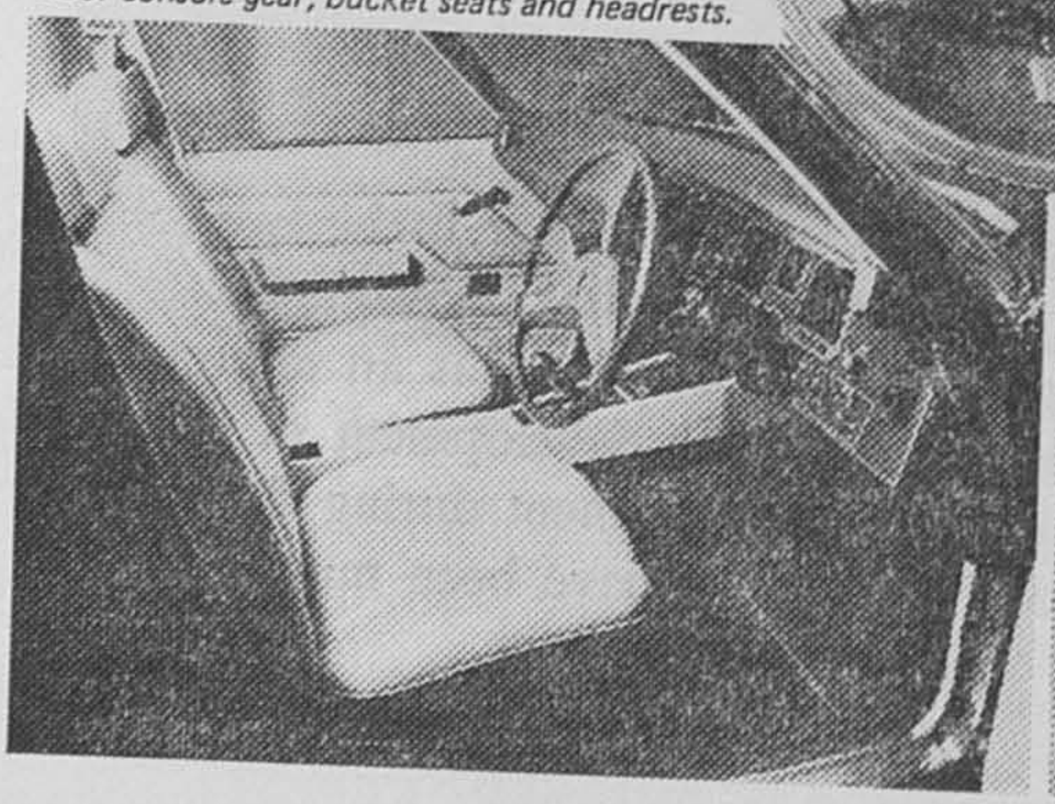
Highway driving 28 m.p.g.
Economy driving (50 m.p.h.) 30 m.p.g.

See it at:
LYONS MOTORS, K.L., Petaling Jaya, Klang and Ipoh or
WEARNES, Penang, Butterworth, Kuantan, Seremban, Malacca, Johore Bahru.

The new Holdens have already changed Australia's ideas about how a good car should look. Drive one . . . and you'll change your ideas about how a great car should ride. A five foot wide track and new big coil springs over each wheel see to that . . . but these are only two changes in the most changed Holdens in history. New styling. New front chassis design. New suspension. New seating comfort. New flow-thru ventilation system. New steering. New brakes. Exciting, new Kingswood, built with your family in mind. Luxurious new Monaro LS model for prestige two-door motoring. Australia's first long-wheelbase wagons. You've got to drive new Holden to believe it . . . and we've got them ready waiting for you to do just that. Do it today. The superb Premier range offers luxurious fold-flat bucket seats with folding arm rests front and rear, and superb fully instrumented walnut facia, with built-in, forced-flow ventilation and concealed air conditioning. A smooth six-cylinder engine provides ample power in silky silence, while power disc brakes give fade-free, safe stopping from high speeds. Optional power steering completes your comfort and safety. And finally a choice of a 3-speed column gearchange, full automatic transmission, or the sporty, 4-speed console shift, with new manual gear-box that allows optimum gear ratios, maximum reliability.



The superb new Kingswood with 4-speed floor console gear, bucket seats and headrests.



The big new Kingswood station wagon with long wheel base — an exclusive chassis design.



than those previously given, especially the potassium fraction. It seems very likely that the high levels of muriate of potash applied have aggravated a situation of already-restricted availability through rendering the remaining soil reserves largely unavailable to the palm through antagonistic activity (Turner & Bull, 1968).

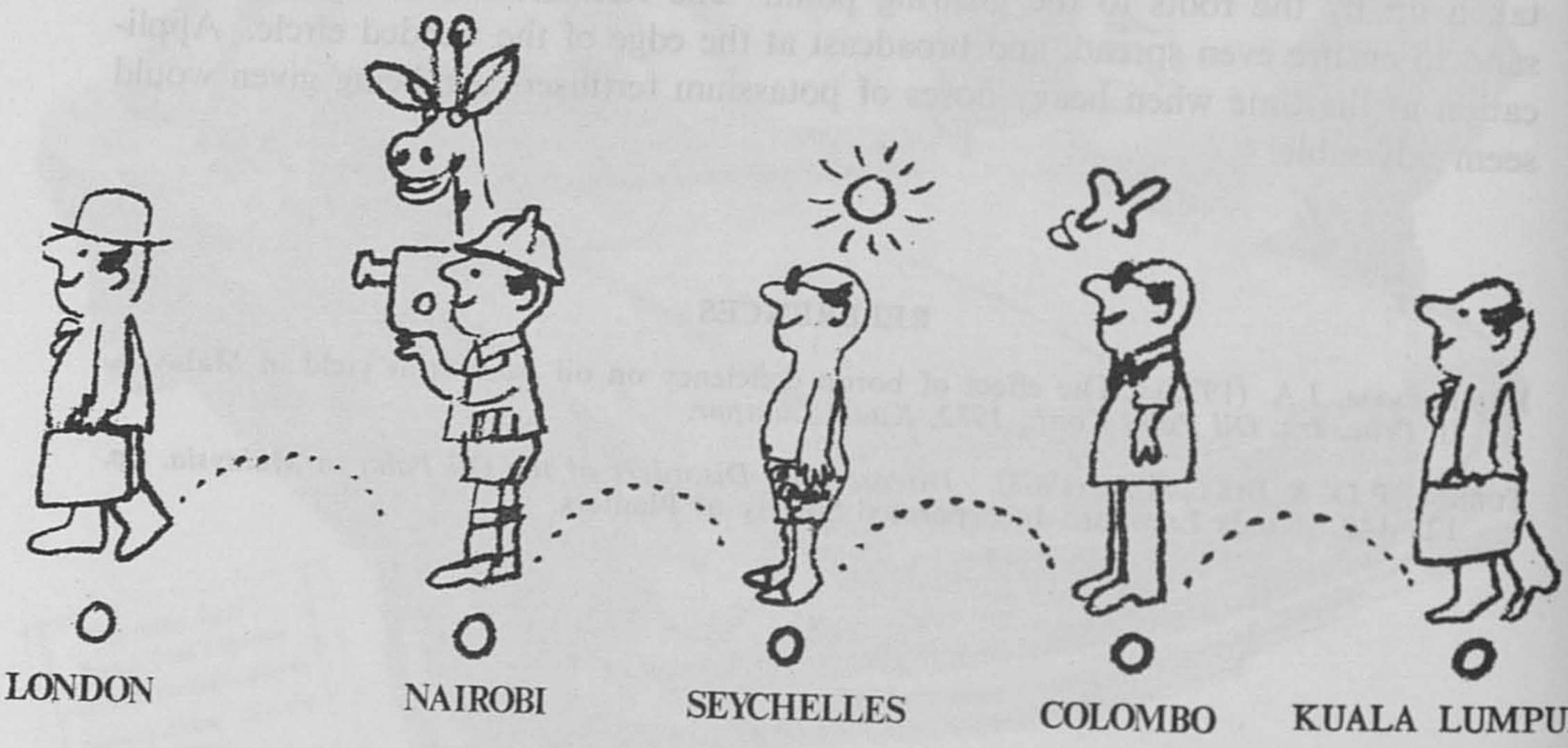
Remedy of boron deficiency symptoms is through application of borax or high grade fertiliser borate (HGFB) at rates according to palm age; these have been given elsewhere (Turner & Bull, 1968). It is no longer considered that boron fertiliser should be applied to frond axils. Lateral movement within palms by this element is very restricted, even if any were taken up from the axils, and any effect is normally the result of the boron being washed down by rain water and subsequently taken up by the roots to the growing point. The fertiliser should be mixed with sand to ensure even spread, and broadcast at the edge of the weeded circle. Application at the time when heavy doses of potassium fertilisers are being given would seem advisable.

REFERENCES

RAJARATNAM, J.A. (1972). The effect of boron deficiency on oil palm fruit yield in Malaysia. In *Proc. Int. Oil Palm Conf., 1972, Kuala Lumpur.*

TURNER, P.D. & BULL, R.A. (1968). *Diseases and Disorders of the Oil Palm in Malaysia,* pp. 125–142. Kuala Lumpur: Incorporated Society of Planters.

Only BOAC can fly you to London via Colombo, the Seychelles and Nairobi.



Let BOAC fly you 'the new way' to London.

Shop for beautiful gems in Colombo. Relax on the fabulous beaches of the Seychelles. And go on Safari in Nairobi.

Only BOAC flies 'the new way' to Europe. All the way by VC10.

Ask your travel agent.

We'll take good care of you.

BOAC

BOAC WITH QANTAS AND SIA

B/St, 17

The Society's Technical Education Scheme

In the light of an increasing number of enquiries about the Technical Education Scheme (TES), especially from younger members, full details of the Scheme are collated and presented below. It is hoped that publication of this information will reduce the necessity for personal enquiries about specific examinations, and the cost of sending copies of syllabuses to individual members.

(1) Eligibility

Only members of the Incorporated Society of Planters may sit for TES examinations.

There is no external examination service for non-members.

(2) Subjects

Examinations are set in the following:

a. Agricultural science (Botany *and* Soils)
b. Estate surveying
c. Estate book-keeping
d. Estate practice (Rubber *or* Oil Palm *or* Cocoa)
e. Malay language
f. Tamil language
g. Chinese language (by special arrangement)

(3) Marking

The pass mark in all examinations is 60%. A 'Distinction' is awarded to candidates achieving 80% or more.

Results are sent to candidates within 48 hrs of their being received from examiners, but it should be borne in mind that the latter are busy, professional men who have volunteered for the task, and that some delays in marking papers must occasionally be expected.

Answer papers are not returned to candidates under any circumstances.

Model answers are not provided; examiners' comments are published in *The Planter* or The Planter *Supplement.*

(4) Fees

Entrance fee is $30.00 per examination payable on registration. A candidate who fails to attend for examination is liable for forfeiture of fee unless a minimum of two weeks' notice of cancellation is received, or he is prevented from attending by circumstances genuinely beyond his control.

(5) **Closing date for entries**

Entries are not accepted less than 2 weeks before the examination date.

(6) **Associateship Diploma**

The Society's Associateship Diploma (AISP) is awarded to members who have passed the first four examinations listed above: 2a, b, c and d. The examinations may be taken in any order.

(7) **Syllabuses**

These are described in detail on the following pages.

(8) **1973 Programme**

This is published below and also in the *Supplement* to this issue. All dates are provisional.

Examination	*Date*	*Entries close*
Book-keeping	10 January 1973 13 June 1973	— 30 May 1973
Estate Surveying	14 February 1973 17 October 1973	31 January 1973 3 October 1973
Estate Practice*	14 March 1973 12 September 1973	28 February 1973 29 August 1973
Malay Language	17 April 1973 24 October 1973	3 April 1973 10 October 1973
Agricultural Science†	16 May 1973 14 November 1973	2 May 1973 31 October 1973

* State 'Rubber' or 'Oil Palm' or 'Cocoa'

† State 'Botany' and/or 'Soils'

Estate practice examinations

These examinations are held in Rubber, Oil Palm and Cocoa. Candidates must have been in the plantation industry for not less than 3 years and have had at least 18 months experience with the crop. A minimum of 6 months actual field experience on an estate is considered essential.

Papers are in two parts (see *separate syllabuses*) *both of which must be taken at the same time, with the exception that a candidate who has previously failed Part 2 need resit this part only at a subsequent examination. Failure to pass Part 1 means taking both parts again.*

Rubber

PART 1

(1) **New planting and replanting**

Methods of clearing, felling, poisoning, terracing, drainage, fencing, roads and all aspects of preparation for planting.

(2) **Planting methods**

Use of various types of planting materials and methods of planting.

(3) **Propagation**

Establishment and maintenance of nurseries; multiplication of planting material; types of planting material; recommended clones and seedlings.

(4) **Covers**

Types and uses of covers; establishment and maintenance.

(5) **Field maintenance**

Weeding; manuring; pruning; drainage; soil conservation; thinning; herbicides and wound dressings; catch-cropping and grazing.

(6) **Pests and diseases**

Recognition and control of pests and diseases in rubber and covers; fungicides and pesticides.

(7) **Tapping and collection**

Tapping systems; equipment; notations; stimulation; organization of collection.

PART 2

(1) Manufacture

Manufacture of sheet, crepe, concentrates, special purpose rubbers, and new forms of crumb and block rubbers; grading systems; packing; drying. Defects in product and methods of correction.

(2) Management

Labour and general management; labour requirements; structure and operation of current wage agreements; essential parts of Labour Code; estate organisation; estimating; costs of production; working knowledge of use and operation of normal estate records and reports, (Annual, Progress, etc.).

(3) Buildings and machinery

General knowledge and costs of construction and maintenance of estate buildings, and care and maintenance of machinery and transport. Knowledge of agricultural implements normally used on estates, tractor operating costs; construction materials used in estate work.

(4) Medical and sanitation

Responsibilities of management; anti-malarial work; sanitation; water supplies; housing; notifiable diseases; poisonous snakes and other dangerous animals, (types and treatment).

SUGGESTED LITERATURE

Manual of Rubber Planting (Malaya) 1960, by A. T. Edgar

RRIM *Planters' Bulletins*

Maladies of Hevea in Malaya, by R. N. Hilton

Mineral Deficiencies in Hevea and Associated Cover Plants, by V. M. Shorrocks

Pests of Hevea Plantations in Malaya, by B. Sripathi Rao

RRIM Planting Manual No. 11 *Clones of Hevea Brasiliensis of commercial interest in Malaya,* by E. C. Paardekooper

RRIM Planters' Conference papers

MAPA/NUPW Wage Agreements

Labour Code and Government Ordinances

Oil Palm

PART I

1. **Oil palm breeding and selection:** Fruit types; principle techniques and aims of breeding; selection of parent palms.

2. **Planting material:** Germination; pre-nurseries; nurseries.

3. **Planting:** Felling and Clearing jungle, rubber, coconuts and oil palms etc; palm density; lining; planting techniques.

4. **Field engineering:** Soil and water conservation; terracing; drainage; road and rail layouts; access and harvesting paths.

5. **Field maintenance of immature and mature areas:** Weeding (including herbicides); cover crops; intercrops and catch crops; grazing; control of interline vegetation.

6. **Palm maintenance:** Ablation; assisted pollination; pruning.

7. **Yields** and the factors influencing them.

8. **Harvesting and fruit transport:** Ripeness standards; harvesting techniques; fruit collection and transport; fruit quality.

9. **Nutrition:** Deficiencies and their symptoms; foliar analysis; soil analysis; fertilisers and fertiliser application.

10. **Pests and diseases:** Description; symptoms; prevention; control.

PART II

(1) A brief outline of milling procedures.

(2) Uses of oil palm products, and quality control.

(3) **Management**

Labour and general management; labour requirements, structure and operation of current wage agreements; essential parts of Labour Code; estate organisation; estimating; costs of production; working knowledge of use and operation of normal estate records and reports, (Annual, Progress, etc.).

(4) **Buildings and machinery**

General knowledge and costs of construction and maintenance of estate buildings other than oil mills; and care and maintenance of machinery and transport. Knowledge of agricultural implements normally used on estates, tractor operating costs; construction materials used in estate work.

(5) **Medical and sanitation**

Responsibilities of management; anti-malarial work; sanitation; water supplies; housing; notifiable diseases; poisonous snakes and other dangerous animals, (types and treatment).

SUGGESTED LITERATURE

Oil Palm Cultivation and Management† by P.D. Turner and R.A. Gillbanks

Advances in Oil Palm Cultivation† (1972 ISP Oil Palm Conference)

The Oil Palm by C.W.S. Hartley

Pests of Oil Palms in Malaysia and their Control by B.J. Wood

The Organisation and Control of Field Practice for Large-scale Oil Palm Plantings in Malaysia by J.W.L. Bevan and B.S. Gray

The Oil Palm, its Culture, Manuring and Utilization by Ng Siew Kee

Oil Palm Developments in Malaysia (1967 ISP Oil Palm Conference)

Progress in Oil Palm (1968 ISP Oil Palm Conference)

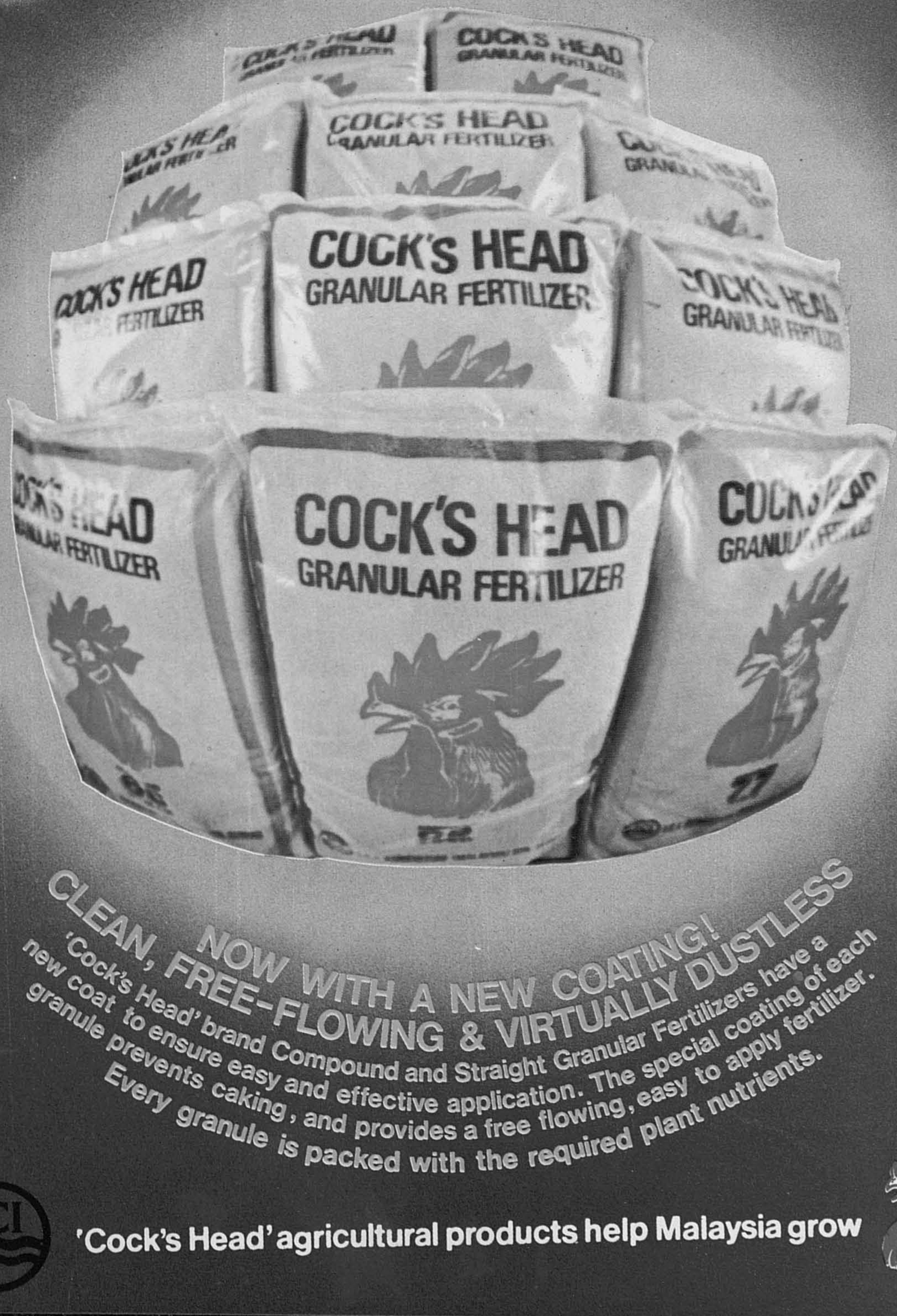
The Quality and Marketing of Oil Palm Products (1969 ISP Symposium)

---

* All these publications are available from the Society at special prices to members.

† To be published by mid-1973.

'COCK'S HEAD'
GRANULAR FERTILIZERS



NOW WITH A NEW COATING!
CLEAN, FREE-FLOWING & VIRTUALLY DUSTLESS

'Cock's Head' brand Compound and Straight Granular Fertilizers have a new coat to ensure easy and effective application. The special coating of each granule prevents caking, and provides a free flowing, easy to apply fertilizer. Every granule is packed with the required plant nutrients.

ICI

'Cock's Head' agricultural products help Malaysia grow



DOWPON–S the effective lalang killer

DOWPON-S is the quick complete 14 days cure for lalang headaches. DOWPON-S, containing Dow's exclusive Dalawet penetrating agent, attacks the lalang roots, killing it completely. Easily applied by spraying or wiping after mixing with water, swift and economical



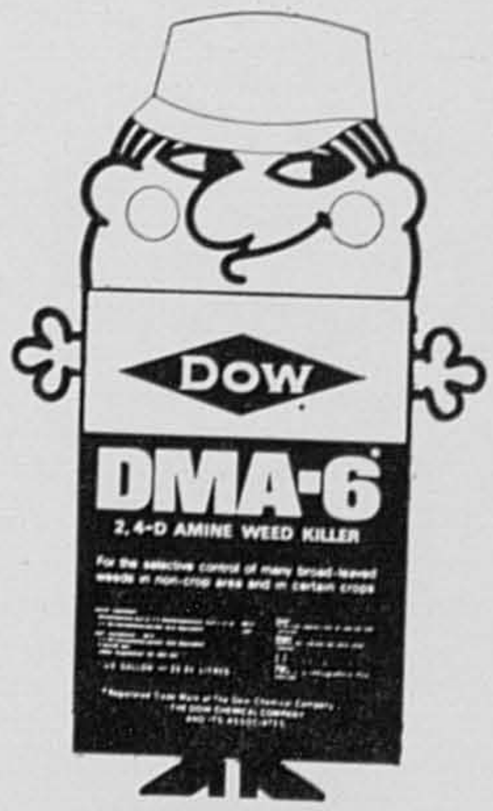
DOW*

DOWPON-S, is only one of Dow's solutions to your agricultural problems. Dow specialises in agricultural science and every product is the result of years of research. So when you're faced with a weed problem, consult the Dr. from Dow. He has the solution.

*Trademark of the Dow Chemical Company.

How to kill off all weed problems with one solution DMA-6

DMA-6 from Dow. No matter what your problem is, broad leaf weeds, hairy or woody stemmed weeds, a mixture of weeds of all shapes and sizes, even tough and hardy grasses, DMA-6 kills them all, completely. For selective weed control, just mix DMA-6 with water. It will kill off broad-leaf, hairy and woody stemmed weeds. A dose of DMA-6 with Sodium Chlorate, Lissapol and water gives you total weed control over a mixed company of weeds, while



DMA-6 with DOWPON-S, MSMA 529 and water is fatal to tough and hardy grasses. Just spray on the foliage and watch your problem wither away. DMA-6 is non-poisonous and non-toxic to your crops and animals. And a hint from the doctor from Dow. For economical application use either the 5 or 55 US gallon drum of DMA-6. DMA-6, another example of Dow's commitment to making your profit grow through agricultural science.

DOW *

*Trademark of the Dow Chemical Company.

Cocoa

As cocoa is not a text-book crop, there exist many situations where the optimum cultural requirements have not yet been evaluated. Answers to questions on such topics will accordingly be assessed on the soundness of reasoning and on supporting evidence provided by candidates.

PART 1

(1) **Botany of cocoa**

Characteristics of main varieties and a general knowledge of their geographic origin; habit of growth; pollination; pod development.

(2) **Basic requirements for optimum growth and yield**

Soil; climate; environment; management.

(3) **Land preparation**

Details, sequence, timings and costings of operations to the point of planting cocoa in different circumstances—*e.g.* from jungle, replanting from another crop, underplanting of economic crops such as coconuts. Merits and demerits of planting under thinned jungle. Spacing; lining; holing; drainage; provision of roads.

(4) **Planting material**

Recommended materials; their characteristics and yield potentials; source of materials. Planting density and patterns.

(5) **Propagation**

Production of improved varieties; vegetative propagation techniques; germination of seeds; establishment and maintenance of nurseries.

(6) **Shade**

Functions; conflicting requirements of light and shade; choice of low and high shade regimes; phasing of planting; planting patterns; establishment and maintenance of shade.

(7) **Field maintenance**

Pruning of cocoa; thinning; weeding policies; use of herbicides.

(8) **Nutrition**

Nutritional requirements, their assessment and their relationship to shade regime; choice of fertilisers; timing of fertiliser applications; fertiliser placement; mulching.

(9) **Pests and diseases**

Recognition of major pests and diseases; predisposing factors; biological control of insects; mitigation of pest and disease incidence; choice of insecticides and fungicides; spraying techniques.

(10) **Harvesting**

Methods; criteria; transportation of products to factory. *Pros* and *cons* of organising pod-breaking in field or factory.

PART 2

(11) **Manufacture**

Factory planning; layout and organisation; costings.

Fermentation methods; changes during fermentation; factors influencing fermentation results.

Natural and artificial drying methods; pre-drying treatments; changes in bean during drying; moisture assessment.

Bean grading; packing; storage.

Manufacturers' requirements; quality control and tests.

(12) **Management**

Labour and general management; labour requirements; structure and operation of current wage agreements; essential parts of Labour Code; estate organisation; estimating; costs of production; working knowledge of use and operation of normal estate records and reports, (Annual, Progress, etc.).

(13) **Buildings and machinery**

General knowledge and costs of construction and maintenance of estate buildings, and care and maintenance of machinery and transport. Knowledge of agricultural implements normally used on estates, tractor operating costs; construction materials used in estate work.

(14) **Medical and sanitation**

Responsibilities of management; anti-malarial work; sanitation; water supplies; housing; notifiable diseases; poisonous snakes and other dangerous animals, (types and treatment).

SUGGESTED LITERATURE

1. *Cocoa Growers' Bulletin* by Cadbury Brothers Ltd.
2. *Cocoa* by D. H. Urquhart—New edition in preparation.
3. *Cocoa and Coconuts in Malaya*—Proceedings of a Symposium held in Kuala Lumpur, September 1967. Published by ISP.
4. *Crop Diversification in Malaysia*—Proceedings of ISP Conference held in Kuala Lumpur, 1969.
5. *Cocoa and Coconuts in Malaysia*—Proceedings of ISP Conference held in Kuala Lumpur, 1971.
6. *Sabah Cocoa Seminar 1970*—Proceedings of SPA Seminar held in Tawau in 1970. (Papers also reproduced in *The Planter* Vol. 47).
7. Publications in *The Planter*.
8. Publications in *The Malayan* (*Malaysian*) *Agricultural Journal*.
9. Publications in *Tropical Agriculture* (Trinidad)*.
10. *Pests of Oil Palms in Malaysia and their Control* by B. J. Wood—Chapters on ecology of insect pests, principles of insect pest control and insecticide application. Published by ISP.
11. *Processing of Raw Cocoa for the Market* by T. A. Rohan.
12. *Raw Cocoa—Manufacturers' Quality Requirements* published by the Cocoa, Chocolate and Confectionery Alliance—See reproduction in *The Planter* **45** (518): 313–324.
13. MAPA circulars to estates.
14. Labour Code and Government Ordinances.

(* A bibliography prepared by the University of the West Indies on cocoa papers published in this journal is available in the RRIM library.)

Estate surveying

Candidates registered for the complete examination are required to sit for the written part first. Success in this is obligatory for the taking of the subsequent practical test.

Exemption from the written part of the examination may be granted, on application, to candidates holding a degree or diploma in agriculture. Such candidates however are still required to take the practical test.

---

(1) **THEORETICAL TEST.** Time allowed: $4\frac{1}{2}$ hours

(a) Chain and compass surveying.

(i) Correction for errors

(ii) Correction for local attraction

(iii) Surveying over obstacles

(iv) Plotting a closed traverse and adjustment of the plotting misclose

(b) Area computation.

(i) Calculation of the area of plotted figures

(ii) Cutting off a required area from a lot

(c) Care and use of Instruments—precautions to be taken in levelling.

(i) Adjustment of instruments

(ii) Calculation of heights and levels from field notes

(d) Road-making.

(i) Interpolation of contours from spot heights

(ii) Plotting of longitudinal section and calculation of grades

(iii) Laying out a road trace from contours

(iv) Computation of earth quantities in fillings and excavations

(2) **QUALIFYING TEST (PRACTICAL).** Time allowed : 6 hours

To be held in the candidate's own district under the vigilance of the branch chairman or his appointee who shall certify that the work was carried out by the candidate with no technical assistance.

(a) The candidate shall be required to make a closed survey with chain and compass, the area embraced to be not less than 5 acres. He shall submit to the examiner: —

(i) The complete original field notes, in ink, of his survey

(ii) A plan prepared from them

(iii) The area, in acres, roods and poles together with his calculations thereof.

(b) The candidate shall carry out a survey and levelling of a line between 2 points not less than $\frac{1}{4}$ mile apart to determine the profile of the ground between the points. The levelling, which may be on assumed datum, shall be closed back.

A plot of the longitudinal section indicating the profile of the ground together with the original field notes, in ink, showing the reduced levels.

RECOMMENDED FOR STUDY

ESTATE SURVEYING by R. B. PERKINS

Malay Language

(Elementary)

The examination will generally be based on the standard Malay sentences, covering the operations of clearing, replanting, upkeep, tapping and manufacture. Candidates will be expected to be familiar with a glossary of terms used in the operations of budgrafting, and in pests and disease work.

The examination will be in two parts:—

(1) A 2 hour written paper comprising the translation of 50 words of vocabulary from English into Malay, and 50 words from Malay into English and of 15–20 sentences each from Malay into English and English into Malay on the Planting subjects.

(2) Conversation with a Malay (who may not be conversant with the English language) in which the candidate will be required to converse on subjects relating to estate activity and current affairs. Candidates will be expected to converse without hesitation in speech, in terms free from the grosser errors of so-called Bazaar Malay.

The candidate is required to pass in BOTH parts of the examination at the same sitting.

The following are recommended for study: —

Teach Yourself Malay by M.B. Lewis

Colloquial Malay by Richard Winsted

An unabridged Malay-English Dictionary by Richard Winsted

A Practical English-Malay Dictionary by Richard Winsted

Malay Dialogue by Mohd Ali

It is strongly recommended that candidates engage a teacher, and valuable assistance may also be obtained by listening to the Malay lessons broadcast in the Blue Network of Radio Malaysia.

Candidates are reminded that Malay is the National Language of Malaysia and it is their duty to make a formal study of that language. Knowledge of the grammar and syntax is essential and while candidates for the elementary examination are not required to have a knowledge of Jawi, it is nevertheless an absolute requirement that the written papers be completed in acceptable Rumi (Romanised Malay). The recommended text books are the best foundation for a knowledge of good spelling, and the TES Committee advises prospective candidates to make a close study of them.

During the present transitional period between the old spelling and the new, candidates are urged to master the latter as quickly as possible. A guide to the new spelling system may be obtained free from the Dewan Bahasa dan Pustaka.

Berita Harian, the Romanised Malay edition of *The Straits Times* and *Utusan Malaysia*, the Romanised version of *Utusan Melayu* are recommended as a source of information on topical affairs. But the best source of knowledge of all is in the labourers with whom the candidate comes in contact, and it is to the daily practice of conversation with the labourers that the committee especially recommends the candidate.

Malay Language

(Advanced standard)

This is similar to the Standard II examination for Government Officers except that no knowledge of the Jawi Script is required.

The examination will be in two parts:—

(1) A $2\frac{1}{2}$ hour written paper in Rumi (Romanised Malay).

Translation from Malay

Translation into Malay

Composition in Malay

General Paper

The remarks on the new spelling system given in the elementary syllabus apply equally to the advanced level.

(2) A half-hour oral examination in which the candidate will be required to converse without hesitation with a Malay (who may not be conversant with the English language) on subjects relating to estate activities and current affairs.

In addition to the text books, pamphlets etc recommended for the elementary examination the following books should be studied:—

Tangga Bachaan
by Ahmad Murad bin Nasruddin

Pelanchar Bahasa Kebangsaan
by Syed Kassim bin Mohamed
and Mohd Yusuf bin Arshad.

Additional readings should include the more difficult texts of the editorials in the Malay papers and the RRIM publications, viz. *Siaran Pekebun* and *Getah Asli*.

A guide for examinees

Confidence is of the utmost importance when taking an examination and everything should be done to foster this feeling. The well-prepared candidate who knows his subject should be able to enter the examination room feeling sure of himself.

Nobody can expect to pass unless he has prepared thoroughly. It must be remembered there is no substitute for work. Do not join the gang of happy optimists who think that a few hours' light reading will equip them for the ordeal to come. Methods of preparation should vary with the examination being taken and with the entrant's mental equipment.

Some people learn best by aural methods—lectures, discussions and reading aloud, whilst others absorb facts more easily by note-taking, *précis* and reading. Have you a mathematical or literary turn of mind? Do you work best in short bursts or long sessions? Does it suit you to work alone or in groups? Set your own pace and method.

It is essential to get over any mental sluggishness before you start work. There is no point in just reading a book unless you absorb and understand. Hours can be spent reading without achieving anything—this is not preparation. Activate your mind before you start each session; this can be done by a short period of hard work—revision, a mathematical problem, rearranging previous notes or trying to understand something which puzzled you previously. Last but not least, find out what the syllabus demands of you.

The following procedure is suggested: —

First read your set books at a brisk pace.

Then go through them again slowly, making notes. Use clear headings, underlining for emphasis, and using cross references in your notes.

Tackle difficult parts several times, returning to them until they are mastered. Always clear up the obscure.

Use a loose-leaf book for your notes, so that notes can be expanded as your knowledge progresses.

Prepare your notes carefully so that they are a guide to the whole syllabus. Good and clear notes are essential. Prepare a *précis* of the main points and headings for easy revision.

Memory aids can be useful—possibly diagrams or graphs or charts or pictures.

If possible the aural side should not be neglected—discussions and lectures, if these can be arranged, are useful. The subject should be discussed with any of your friends who are also studying. This will help to make you familiar with the subject and to understand its various aspects.

The study of previous papers is very useful and should be considered an essential part of your learning. Write the answers out in full as this will give you confidence in putting your knowledge into print. After some practice, time yourself in answering a set question and train yourself to answer questions within the stipulated examination time. Check your answers with the set books.

Revision is a continuous process and some form should be carried out at each session. A useful exercise is to try and write notes of the previous session's work *from memory.* Notes should be re-read often, facts marshalled and reshuffled if this leads to greater clarity. Don't be afraid to rewrite notes which are no longer clear or up-to-date in the light of your greater knowledge of the subject. Make a list of grades of how you stand on various subjects.

A few DO s and DON'T s

DON'T . . . . Spoil your chances by over-indulgence the night before.

go at all unless you know your subject.

cram up to the last minute.

try learning the whole syllabus the day before.

BUT DO . . . . enter the examination room with a fresh mind uncluttered by frantic cramming the night before.

a little *careful* revision the day before. Fill in gaps; bring disconnected points together; verify important facts.

go into the examination with confidence engendered by a period of full and careful preparation.

A mere knowledge of the subject is unfortunately not enough for success; a specific technique is involved:

Read all the instructions carefully. If you are required to answer all the questions, do just this.

Then read all the questions carefully and ration your time accordingly—for a 3 hour paper with 5 questions to answer, allow 5–10 minutes to collect your thoughts and a similar period to read and edit your answers. This allows 33 minutes per question and this programme should be *strictly* adhered to.

Marshal your facts and plan your answer before you start—this should be done by writing a few notes on rough paper.

What is the examiner looking for? This implies reading and understanding the question. Remember the examiner wants to know what you know—not what you don't.

Now tackle the questions and choose the easiest first, so as to gain the necessary confidence. If you can establish confidence you will find your mind working freely, and facts springing to mind which you thought you'd forgotten.

Aim at order, clarity, completeness, brevity, legibility, and *stick to the point.* Answer the question, not some other hypothetical problem.

Present your answer logically and understandably with headings and in note form if the question lends itself to this type of answer.

IF YOU FOLLOW THIS GUIDE CAREFULLY YOU'LL HAVE A GOOD CHANCE OF PASSING—EXAMINATION TECHNIQUE IS AN ART, TO BE STUDIED AND MASTERED.

Planter, Kuala Lumpur **49:** 30–50 (1973)

Conservation in Malaysia

P. R. WYCHERLEY

PART SIX — THREATENED SPECIES

One mammal and one bird species have, on the average, become extinct each year somewhere in the world during the last 50 years. This is not a response to some change in climatic conditions or due to displacement by more advanced species of the same group in a process of natural evolution. This is a direct response to human technological developments enabling man to change the face of the earth and to kill on a greater scale than ever before. The desire of previous generations to make their existence more comfortable is trivial compared with the urgency created by the increase in human population, largely ill-nourished and malcontented consequent on advances in public hygiene.

The extremely slow, imponderable forces of evolution have produced the universe, our planet and life upon it as we know it. In this slow process some forms of life have become extinct, but meanwhile during the same long duration of time others have evolved, succeeded and replaced them. The impact of mankind has been largely towards destruction and extinction of species without producing a commensurate number of new forms capable of independent survival. Crop plants and domestic animals seldom run wild, they need protection, but mankind does make it possible for existing species to run riot as weeds and pests. The suggestion, that mankind's present activities threatening the survival of so many species, including the human, on this Earth are merely an acceleration of a natural or divine process, is impious, conceited or foolish according to your philosophy.

The Threats

The threats to living species fall into two main categories: — (i) the indirect, by destruction of the habitat or natural environment in which it lives, and (ii) the direct, by killing it before it can adequately reproduce itself. It may be killed to eat it or to use some part of it or to keep and display it. Unfortunately for the animal victims in particular, although this happens to plants too, the killing is not always immediate, but includes keeping in captivity unsuitable for breeding or trying to cultivate under unsatisfactory conditions.

The relative seriousness of these threats varies with each case. In general plants are most seriously threatened by habitat destruction. Plants cannot flee into another area. Although some have means of dispersal equivalent to legs and wings, there is no place for them to go. A plant occupies a particular niche or habitat because it is adapted to the conditions which occur there, the surrounding areas with different characteristic plants have different conditions; if a plant tries to invade these areas—and indeed most plants are constantly trying to spread even if the habitat is not threatened—then it cannot because the space is already occupied by other plants better adapted to the conditions prevailing there. It may sound ridiculous to regard the dipterocarps or any major section among them or even a single species as

threatened, because this family of valuable timber trees is characteristic of forest covering thousands of square miles. Yet it is quite possible for every part of the range of a species or of several species to be alienated for agriculture especially in the lowlands, because so much of the best forest grows on the best land.

Some orchids are threatened by habitat destruction, for instance those on limestone, but often over-collection is an equal or greater risk. So many cannot resist the temptation to pick a flower or take a whole plant, because it is beautiful or rare. Often there is some misguided, vague idea that it will be possible to preserve it in cultivation and thereby do something for conservation. In fact many plants so collected are forgotten, found shrivelled and withered at the end of the journey and thrown out. The cultivation of rarities is a job for experts, who are not necessarily professionals but are at least those with knowledge, time, patience, interest and reasonable facilities. If there is success in growing, it should be followed by multiplication and distribution. Even if the collection is for study, it must not threaten the existence of the species for other students in later generations. Some collectors say they never take more than half what they find, three such collectors in quick succession will decimate a population. Courses in natural history in schools, in biology at the universities and in wildlife management in the forest and game departments should include instruction on how to collect specimens, especially how to take sufficient suitable material to effect identification without unnecessary excess or damage to the species' survival. If students are trained to make full notes on every specimen, including the purpose of collection, as a routine, this increases the value of the specimens taken and discourages wanton, wasteful collection.

These arguments apply to animals also. Habitat destruction reduces the range available to many animals and some invertebrates in particular have very special requirements. Nevertheless there are good prospects of many animals being able to move physically and to survive in their new homes, especially if, to assist them in adaptation, some management is applied to the reception area, which must now carry a higher stocking or attain a new equilibrium between the invading and resident species.

Over-collection by naturalists threatens a number of rare species, in particular the cave fauna where the living fossil trap-door spiders have caught the imagination of the unthinking. The suppliers of specimens threaten the giant toad, if not with extinction at least with artificial pressure towards the smaller size classes and a modification of its relationship with other species. The cone shells are disappearing from the reefs to become dead *bric-à-brac.* The reptiles and the big cats lose their lives and their skins to decorate society's expensive women. The collection of live specimens for medical research, zoological gardens, circuses, cinema and television films and as picturesque pets is accompanied by an appalling casualty rate. Often there are ten or more deaths in capture or transit for every one which reaches its destination alive. That destination is usually a dead end too as far as mating, breeding and maintaining the species are concerned. There is a minority of zoos which are trying to care for and breed rare animals; there should be more, but for the greater part the traffic in live animals is a cruel and pointless inroad on the world's wildlife.

The Hungry

Turning from these instigators of over-collection of live and dead animals, it is almost a relief to consider the problems of those who kill or make the first capture because they are in need. They may need money to buy food, clothing, fuel and shelter for their families. Often they kill simply to eat in response to the primitive hunger for protein. Protein deficiency is a painful fact of existence for half the world's population. At first it seems impossible to conserve wildlife in the face of such a problem.

Nevertheless there are examples of how a species has been preserved in greater numbers than before and at the same time a greater recurrent crop of food has been taken from it, when this is planned and controlled. Wherever this can be demonstrated to the hungry man, there is a reasonable chance that he will cooperate in conserving this resource for himself and posterity. Perhaps the prospects of educating the greedy, sophisticated exploiters of wildlife and obtaining their co-operation are most remote than getting the understanding and cooperation of the man whose main problem is a fundamental need to eat. However, we can but try to cure the problem of the man on the ground and hope that this cuts off the supply to the greedy middleman and luxury users.

Stocking

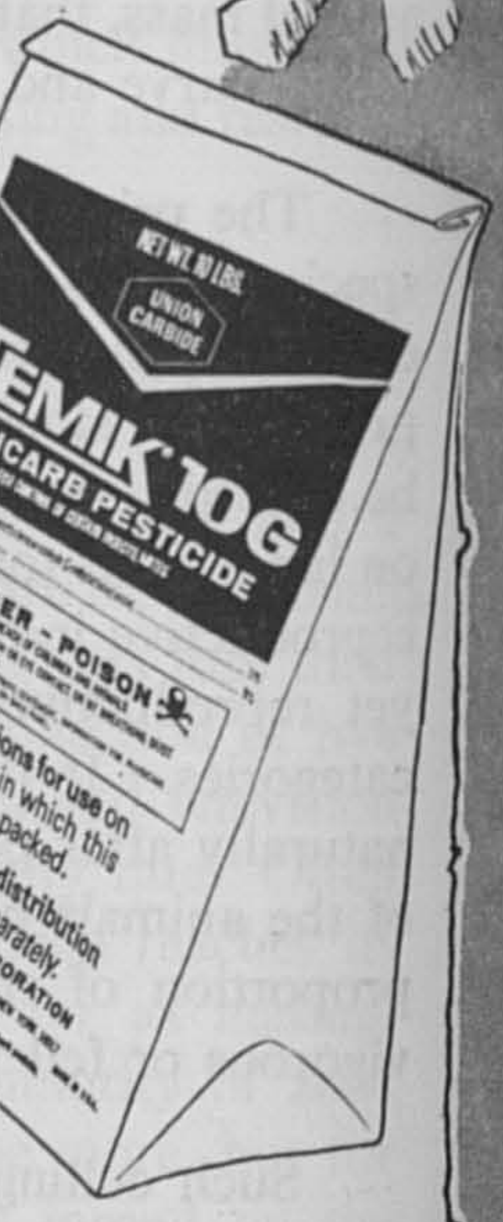
This is the first of several simple concepts which can be applied to wildlife management. Alone it is significant, but in practice it must be combined with others for the maximum advantage. The principle of stocking is simply that a given area of land vegetation or volume of water under relatively stable conditions can support a certain mass of animal life. It follows that if one attempts to support a larger mass of animal life without a drastic modification of the conditions, then part of the animal mass, that is some of the animals, must either move out of the area or remain there, starve and die.

The principle of stocking does not define whether the animals are all of one species or of different species. It does not define the distribution of age, size or sex classes within the population or rather mass (weight) of animals concerned. The principle of stocking requires only that a certain total weight of animals should not be exceeded under given conditions, this applies as much to fish in water as animals on land. This total weight could be made up of a few, large, old, isolated, no longer reproductive individuals, or of many, small, young, over-crowded, competitive, not yet reproductive individuals, or it could consist of a balanced population of all categories. If the last is achieved, instead of waiting for the old animals to die naturally after perhaps occupying space without reproducing for some years, some of the animals past their reproductive prime could be culled for food. Similarly a proportion of the young might be taken before they were ousted by the more vigorous or fell victim to predators or disease.

Such culling or cropping of wildlife, usually of pig, deer or wild cattle, may compete with the big cats and other animals it is desired to conserve. This probably forces a similar adjustment in their stocking, namely that if culling climinates the

Rich harvests begin with TEMIK 10G

aldicarb pesticide



Nurserymen ! Estate planters ! Commercial flower growers !

This is the new aldicarb granular systemic pesticide with triple action. Controls insects, mites and nematodes. Controls a broader spectrum of pests than other systemics.
Fast acting—works within hours. Long lasting—residual protection lasts up to ten weeks.
Highly effective—consistently improves crop yields.
Consistently increases profits for you !

For technical information, ask UNION CARBIDE Union Carbide Malaysia Sdn. Bhd.
P.O. Box 94, Johor Bahru.

old and ineffectual among the prey, only the fittest among the predators will survive also. Thus without altering the overall stocking it is possible to have more active breeding animals and take a culling to provide protein for human consumption.

Management

The culling by hunting for meat of game as it approaches or exceeds the limit of stocking is an obvious form of management, once the principle of stocking is appreciated. When a new equilibrium has been attained, he animal population will consist of breeding animals and their young, a proportion of which can be taken as a regular crop. Of necessity this taking of game is by shooting, which is regarded by professional hunters as an occupation and by amateurs as a Sport. The hunting of game as a sport is criticised by some on humanitarian or ethical grounds. However, only the practising vegetarian has a case. The journey to the abattoir and the butchering of domestic animals is still far from humane in the fullest sence of the word, it is simply conveniently delegated to others and kept from public sight in most cases.

The management of game by regulated hunting means that the animals have one more predator among many. Man as a predator has the power to kill discriminately and so to preserve an ideal proportion of age groups in the game population and thus foster its survival. The hunt itself taxes human endurance and ingenuity, moreover people are often prepared to pay for the privilege. We no longer pretend that animals enjoy being hunted either by us or by natural predators. We do not pretend—although we prefer to forget—that many domestic animals like spending their last hours waiting in line for death with the blood of their own kind constantly in their nostrils. Hunting by shooting with appropriate weapons has a place in the management of wildlife for their survival.

Related aspects of management concern determining the best time to carry out culling. Usually it is best not to disturb the animals while the young are still tender. Where there is a seasonal climate, it is often best to cull before the adverse season. At the end of the favourable season the stocking is at a maximum and will fall during the adverse season. The difference in stocking between the good and the lean season is realised in nature by death of the excess animals. They can be taken as crop at the end of the favourable season. The adverse season in Malaysia is usually the dry spell in the fore-year. However, such procedures should not be applied on a large scale until they have been proved by suitable experiments.

In temperate regions the traditional duties of gamekeepers in charge of raising birds for shooting are to protect the game birds by destroying natural predators or so called vermin, especially during the nesting season, to feed the birds during bad spells, to modify conditions as believed to be beneficial, for example to burn old heather, and to keep away unauthorised hunters or poachers. Wildlife conservators may have to carry out similar tasks for animals in Malaysia. Hatcheries are very important in turtle conservation. Modern concepts are less harsh on natural predators, because these are part of the natural control system of stocking and eliminate the sick among the prey preferentially. Many predators are threatened species themselves. Habitat modification in order to increase the stocking capacity

is often necessary, although less dangerous means than fire are recommended. Poachers must be rigorously excluded, not just because they are thieves or dodging payment of revenue to the government, but because their activities can jeopardise the entire plan to maintain the correct stocking and age structure of the population.

Habitat modification

Animals have several different requirements, the most obvious is suitable food, including water and adequate salt in the diet or access to salt licks. Under natural conditions an animal may not get all its food, water and salts in the same place, but may browse or hunt in one place, drink in another and visit salt licks elsewhere. Serow are strangely attracted to limestone hills although they roam far over the granite too; perhaps they need to eat lime-rich plants occasionally.

Animals also need various kinds of 'cover'. Many cattle especially water buffaloes, have poor heat tolerance and need access to water for bathing as well as drinking, or they need shade from the heat of the sun. Primates on the other hand are susceptible to chill, especially those like the orang-utan with rather thin hair. Thus their sleeping cover must be warm as well as hidden from their enemies. Protective cover is most important during the breeding season and the requirements are then often more stringent than cover for mere sleeping or resting. A bird's nest is breeding cover, which it constructs for itself; however, both a suitable site and appropriate materials are needed.

Often an area would be able to carry a heavier stocking or to carry more species, if some lacking factor was supplied or developed by modification of the habitat. If the vegetation is slashed occasionally to produce more grass or undershrub, a considerable improvement in herbivore stocking and consequently of predators may be achieved. It is probably best to rotate the portions treated in this way over the larger area available, so that they can undergo natural restoration of soil fertility by forest regeneration like mild shifting cultivation. Also the regenerating thickets may provide suitable cover for some purposes. In cases it may be necessary to plant shade trees. The provision of water by diverting streams and the creation of artificial salt licks are now well known aids to management. These artificial devices may be located where the game warden or wildlife conservator chooses. This may be in some protected place away from likely disturbance or poachers.

The treatment of regenerating productive forest is habitat modification on a very large scale. Treated forest, especially if the old trees have been poisoned, is rich in secondary growth species, which seems to figure largely in the diet of some wildlife in particular large herbivores. Thus these areas may be able to carry a larger stocking of wildlife than before. Of course a tree poison less attractive and less toxic to wildlife than sodium arsenite is an even more urgent necessity in these circumstances. Since there seems to be less difference with altitude in the nature of secondary vegetation than in the type of primary forest, it may be possible for some animal species to extend their range up into regenerating hill forest. This is not known yet and more investigation is needed.

SI-RUSA INN

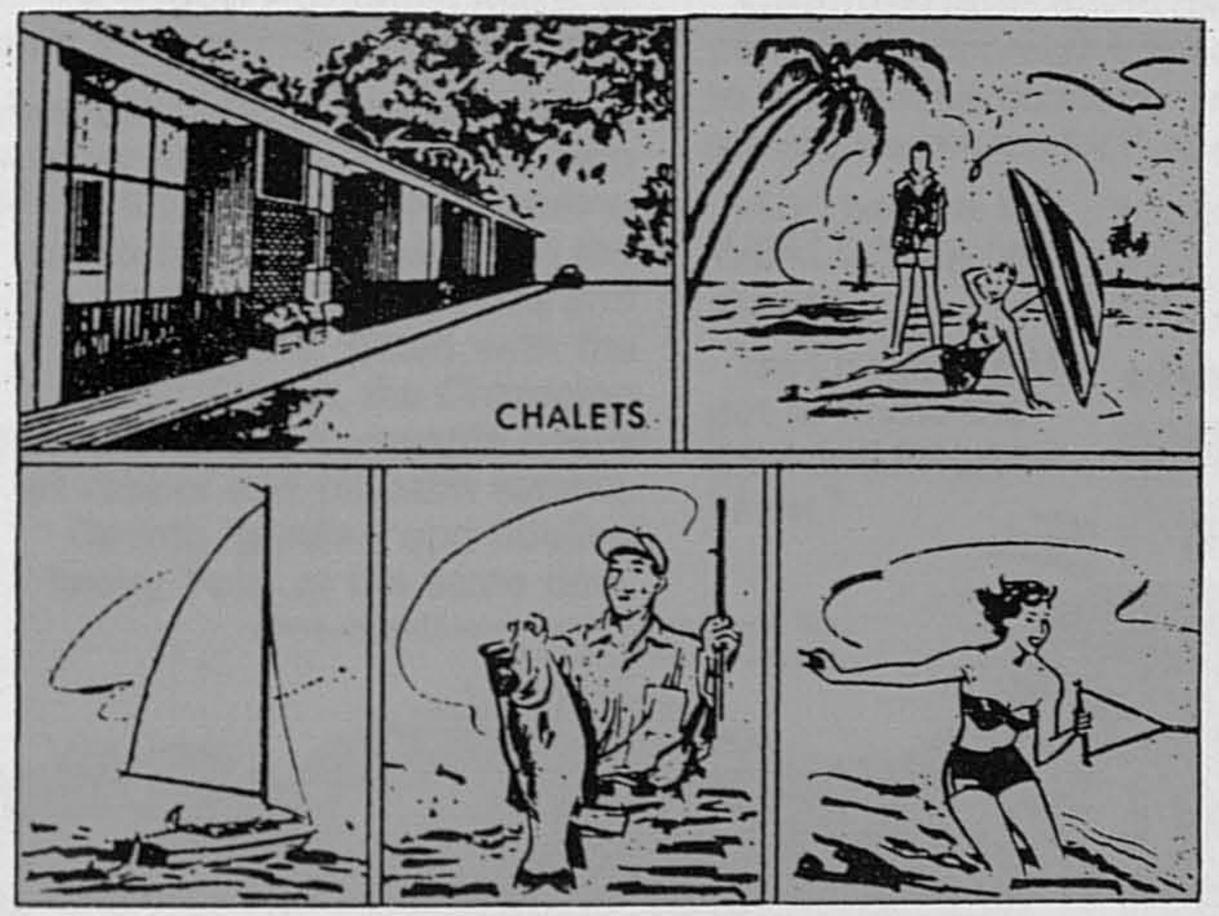
AMERICAN EXPRESS CARDS

SUNSHINE HOLIDAYS BY THE SEA AT PORT DICKSON

For Reservations, Write or Phone:—

THE SI-RUSA INN,
7th Mile, Jalan Pantai, Port Dickson, Malaysia.
Telephone: Telok Kemang 231

WEST MALAYSIA'S VACATION LAND!



The SI-RUSA INN has more than 130 air-conditioned and 'Sea Breeze' Chalets, with twin beds, private bathrooms (Hot & cold water), built-in wardrobes, extn. phones, wall to wall carpeting, and rental rates commencing @ $22 to suit all holidaymakers pockets.

The facilities available include:

Deep Sea Fishing	—	Inshore Fishing
Swimming and Bathing	—	Speedboats
Television	—	Water Skis
Fast Laundry Service	—	Sailing Boats
'Long Term' Discounts	—	'Off-Season' Discounts
Safe, clean beach	—	Golf (Local 9 holes)
Asian Cuisine	—	European Cuisine

And our latest attraction—A new 'LARK' 15 ft Sailing Dinghy for experienced 'Yachtsmen'

WE HAVE EVERYTHING—INCLUDING PEACE AND QUIET IF YOU WANT IT—
WHY TRAVEL OVERSEAS WHEN EVERYTHING YOU REQUIRE IS HERE?

Isn't it time you got to know Chamberlain better?

Chamberlain: the largest Australian maker of tractors and agricultural equipment.

Chamberlain: big, powerful tractors, ready for any task. The Champion Mk III Industrial tractor is hauling up to 50 ton containers in the dockyards of Malaysia and Singapore. Fitted with the Dozer/Grader, the Champion Mk III meets the versatile needs of rubber and oil palm estates. Dozing, grading and hauling heavy fruits at the same time.

photo: Dozer/Grader at work on the Sungei Tong Oil Palm Estate, Trengganu.

Chamberlain: tough machines for tough conditions. Impressive specification coupled to astonishing economy and reliability have proved the reason for their popularity.

And backed by WEALCO big 'W' service.

Isn't it time YOU got to know the **CHAMBERLAIN** better?

chamberlain



WEALCO

WEARNE'S EQUIPMENT AND LAND CO.(PTE) LTD

45, Leng Kee Road, Singapore 3. Tel: 632511
42, Road 31, Jalan Penchala, Petaling Jaya. Tel: 560349
Wearne's in Malacca, Seremban, Kuantan, Kota Kinabalu, Kuching, Tawau, Brunei.
Malayan Development Machinery in Ipoh, Butterworth, Sandakan, Miri.

the big W gives you big service

Isn't it time you got to know Chamberlain better?

Chamberlain: the largest Australian maker of tractors and agricultural equipment.

Chamberlain: big, powerful tractors, ready for any task. The Champion Mk III Industrial tractor is hauling up to 50 ton containers in the dockyards of Malaysia and Singapore. Fitted with the Dozer/Grader, the Champion Mk III meets the versatile needs of rubber and oil palm estates. Dozing, grading and hauling heavy fruits at the same time.

photo: Dozer/Grader at work on the Sungei Tong Oil Palm Estate, Trengganu.

Chamberlain: tough machines for tough conditions. Impressive specification coupled to astonishing economy and reliability have proved the reason for their popularity.

And backed by WEALCO big 'W' service.

Isn't it time YOU got to know the **CHAMBERLAIN** better?

chamberlain



WEALCO

WEARNE'S EQUIPMENT AND LAND CO.(PTE) LTD

45, Leng Kee Road, Singapore 3. Tel: 632511
42, Road 31, Jalan Penchala, Petaling Jaya. Tel: 560349
Wearne's in Malacca, Seremban, Kuantan, Kota Kinabalu, Kuching, Tawau, Brunei.
Malayan Development Machinery in Ipoh, Butterworth, Sandakan, Miri.

the big W gives you big service

The tree top animals lose their habitat in the earlier stages of forest regeneration and treatment after timber extraction. This damage may be reduced if the forest is worked as a mosaic of different stages of regeneration. This may not appear to be the most efficient use of timber extraction trials and similar facilities, because loggers prefer to open the minimum mileage, remove all the timber they can and then abandon these tracks. In future it may be better to preserve a network of roads for easy access by forest officers, game wardens and other conservators of wildlife to manage the forest and game animals within it. A mosaic of forest compartments in different stages may be less prone to erosion, fire hazard and other risks than a large tract all at the same stage. A mosaic may provide the right conditions for animals which require different types of cover and feeding grounds. At present there is too little knowledge about the needs of wildlife and a mosaic pattern has a better chance of supplying these than a uniform system.

Animals on the Danger List

In every part of the world certain species are in great danger of extinction. Every year fewer live specimens are reported. The few survivors are broken up into smaller and smaller groups, less and less able to defend themselves. They are separated by large areas of land alienated to other purposes which they cannot traverse for lack of suitable food and cover, or which it is too dangerous for them to venture into. Thus these small isolated colonies cease to maintain themselves as adequate breeding populations.

This stage may not be recognised or, even if it is, no action may be taken. When a species is in this condition, it may linger on for a few years, but it is often too late already. Just when a move is made to rescue the last survivors, it is found that the species is already extinct. There are animals in that condition in Malaysia. The more important will be reviewed from the sea through the reefs and beaches to the forests and hills.

Dugong

The sea-cows are a group of mammals which live entirely in the sea. The sea-cows browse on green seaweeds in shallow coastal waters. The Dugong is the representative of the sea-cows in South-east Asia. It is so fully adapted to life in the sea that if it is stranded on the shore, it cannot get back into the sea without assistance and will starve to death, unless killed first for its meat.

Dugong get caught in fishermens' nets or in fish traps, where they drown if not brought to the surface soon, because they are mammals and must breathe air. If they do not drown the fishermen usually kill them, mainly because the meat is good to eat, but also because the Dugong damage the nets. They are mistakenly believed to feed on fish and reduce the catch, which is quite wrong. The various improvements in sea fishing, powered boats and larger nets, may account for the apparent decline in numbers. Fifty years ago their meat was said to be quite commonly sold in Malaya and Singapore, but the last specimen dead or alive in these waters was a decayed one 20 years ago. There seems to have been a similar decline along the coast of Sarawak, previously various personal ornaments were made from the tusks, which

{ On the summits is freedom! The breath of the charnel never taints the clear air of the heights eternal. }
Friedrich von Schiller.



This is a drawing from the 68-page Swissair color brochure on everything you can do in the Alps. We present you with the tome to make sure you do it.

WORD HAS more or less got around that the Alps are a fine place for skiing and winter holidays.

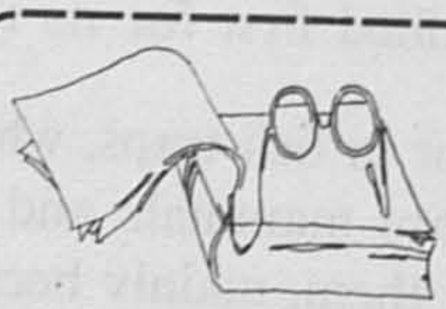
But as to how you climb the Jungfrau by Europe's loftiest cog railway; how long decency permits you to spend in covering a 30-kilometer cross-country course and what that is; the best way to recuperate from a spill off a skeleton toboggan; and how James Bond got up the Schilthorn...

All this is to be found in our Alpine encyclopedia with the apt title of *Snow Beach*.

It's really entertaining reading—though Swissair didn't write it for fun. Actually it's a detailed and accurate work of reference with calendars of events, ski-lift fares, prices, air routes, and every variety of sports.

But don't imagine you can simply order the best-seller, read it, and then stay at home. Everything in the book is true, true enough, but so compellingly described that you won't be able to resist.

So you have been warned; Swissair wishes you happy holidays in the heart of Europe.



Oh, all right, please send this Snow Beach album.
But gratis, if you don't mind, and in particular without obligation. Merci.

Name

Address

Cut out and mail to:
Swissair, Hotel Merlin, Jalan Treacher, Kuala Lumpur, Tel: 27386

SWISSAIR

GGK

only the male bears, but now these are no longer obtainable. Only on the east coast of Sabah do Dugong still seem to be fairly plentiful, although most reports are of animals taken in nets and traps.

It is difficult to suggest measures likely to be effective in saving free-ranging marine mammals prone to accidental drowning in fish traps and nets, even if it was possible to prevent deliberate killing of captured animals by enforcement of legislation for protection (which does not exist on the statute books of most countries in the region). Here is a problem in which the skin-divers may help. The sub-aquarists have been criticised for over-collection of shells, but here is a way in which they may help to redeem their reputation among conservationists. Very little is known about the Dugong; there are only vague indications about its feeding and cover requirements. Skin-divers have reported animals which may be Dugong. If they can confirm this and follow it up by discovering the favourite feeding grounds and more of its natural history, then it may be possible to declare submarine natural reserves in the most suitable areas. The reserves or underwater parks must be kept free of fouling and there should be no fishing by net or trap in the vicinity. The Dugong should be afforded legal protection against deliberate killing throughout their range. If rescued from the brink of extinction, it might one day be possible to use Dugong in the better ordered cropping of the sea, which is still one of the most extensive natural resources hardly exploited in a rational manner.

Coral and Shell

The corals belong to the same group of animals as the jelly-fish and sea-anemones; both the latter are soft bodied. The familiar jelly fish float in the sea but the sea-anemones are sedentary. The corals are also soft bodied and sedentary, but they secrete calcium carbonate around and beneath themselves, so that it forms a hard shell or external skeleton. Only the topmost layer of a large coral reef is living, the greater part below consists of the accumulated shells of old dead organisms. The various patterns the coral assumes are due to the ways in which the organisms lay down their shells and are positioned in relation to each other. Coral requires warm water and sunshine.

The common sea shells are the outer coverings of molluscs, for instance cockles, mussels, oysters and snails. Among the most attractive shells are the cowries and the cones. Some of them attract high prices. As a result skin-divers collect them in large numbers and have almost wiped out the more beautiful in easily accessible places. Coral is also collected. Perhaps this over-collection is unlikely to cause any but the rarest species or those whose natural distribution is limited to easily accessible places to become extinct, but these certainly are at risk. However, it is bad enough that these animals can no longer be seen alive in those parts of the sea most accessible to the sub-aquarist of average ability or the tourist for whom glass-bottomed boats may be provided.

Only a small proportion of these underwater trophies are taken for scientific study or lodged in zoological museums. The majority are sold commercially, others are kept as personal mementos of the collector's prowess. As the accessible reefs

are stripped, so many sub-aquarists recognise this as a challenge to assault the more difficult. Many of the coral reefs in Malaysian waters are separated by mangrove; those in adjacent open seas are relatively isolated, as for example those near the Langkawi, Sembilan, Perhentian and Tioman groups. The sea currents are not very strong in the South China Sea and are even weaker in the sheltered Straits of Malacca, as a result eggs and larvae of the reef organisms, including coral and molluscs are not easily carried by the sea from undisturbed reefs to those which have been denuded of all their fully grown breeding stock. The members of the Malayan Sub-Aqua Club have voluntarily agreed to stop trophy hunting on certain islands. Their public-spirited action should be reinforced by implemented legislation to prevent other non-participants in this agreement from greedily undoing this good beginning.

These are not the only threats to the reefs. Fishermen have sometimes used dynamite to kill and take large fish hiding in the coral, which would cut their nets if conventional methods were used. Coral has been blasted also for limestone where other sources are limited. Near the port of Singapore many reefs have been polluted by oil and industrial wastes, others have been silted up by dredging operations or with material carried down by rivers from areas of soil erosion. Reef organisms are very sensitive to silt and toxic chemicals. This is most common near ports, which are being developed throughout Malaysia. If soil erosion, production of industrial effluent or the use of pesticides is extensive upstream, large rivers may be a source of pollution of the inshore reefs, shell beaches and other marine fringe habitats. Even a great excess of freshwater directed upon a reef can kill the living coral if saltwater does not mix in and restore it rapidly. This could occur if a river outlet was channelled or natural currents diverted.

The Crown of Thorns Starfish (*Acanthaster planci*) has become a menace to coral reefs throughout the Indian and Pacific Oceans in recent years. The starfish moves over the surface of the reef poisoning and devouring the living coral. The eruption of this starfish has been blamed on the accumulation in the sea of persistent pesticides which may be relatively more toxic to the natural enemies of the starfish than to the starfish itself, but this is not proven. Over-collection of large molluscs (*Triton*) for their beautiful shells may be another factor. *Triton* feeds on larvae and even adults of *Acanthaster*. The outbreaks in Malaysian waters have not been so serious as on the Great Barrier Reef off Australia or around some Pacific Islands, but there is no guarantee that the situation will not deteriorate. Skin-divers have collected some starfish by hand for destruction or killed them by injecting formalin, but it is doubtful if such methods can do more than keep the population of starfish under control on a few popular reefs. Low voltage electric cables act as fences to contain starfish in particular areas. Research continues from the Red Sea to Queensland and Hawaii. One of the difficulties in Malaysia is that which authorities are responsible for the reefs has not been adequately defined. This point should be resolved as soon as possible, so that when the benefits of research elsewhere become available they may be applied here.

A coral reef is sometimes the front line barrier against the sea, we do not know what may be the consequences of its loss. The reefs harbour fish, which might

otherwise be caught or trapped in such large numbers that they would no longer survive unless they had these refuges, but what if these naturally protected places are broken open and destroyed? Skin-diving is a growing sport for local visitors and for tourists. There is much that is spectacular to be seen. There is much to be learned about the biology of reef and shore life. Underwater photography fish tagging, turtle and dugong reporting, coral and shell inventories are the sub-aquatic equivalent of bird-watching and are perhaps even more exciting, interesting and rewarding. These are the alternatives to hunting and collecting. These are all reasons for the conservation of adequate representatives in submarine nature reserves.

Turtles

Turtles are shelled reptiles of the zoological order Chelonia. They can be divided into (i) the true Turtles which spend their lives in the sea or freshwater, except when the females come on land to lay their eggs, their limbs are converted into flippers, (ii) the Tortoises which live on land and whose feet are clawed, and (iii) the Terrapins which are equally at home on land or in the water, often living along river banks. In all three groups there are vegetarian and flesh-eating species. The vegetarians provide the choicest meat. Some of the flesh-eating and especially the carrion feeders are dangerous to eat owing to toxicity. The eggs of all species are edible.

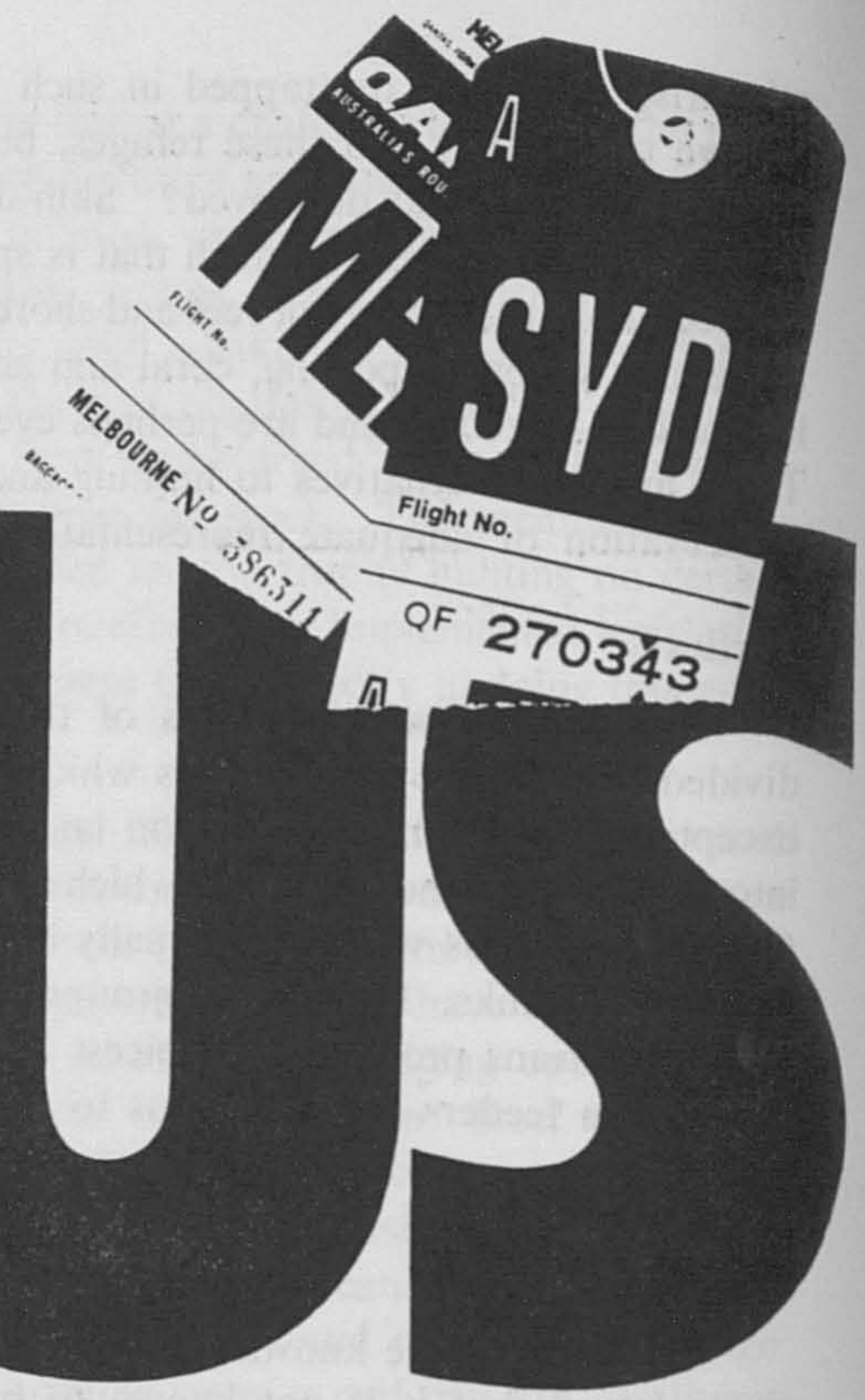
Marine Turtles

Five species are known in Malaysian waters. The Loggerhead Turtle is sometimes found, but it is not known to breed on Malaysian coasts. The Hawksbill Turtle does not seem to breed here either. Both the Loggerhead and Hawksbill are carnivorous feeders on fish, molluscs and crustaceans: neither is taken for its flesh. Since they do not lay their eggs on Malaysian shores in quantity if at all, protection of the species must lie in other hands. The Hawksbill is the source of commercial tortoise-shell and some animals are killed to obtain it. The invention of many more serviceable substitutes may reduce pressure on this species.

The Pacific Ridley Turtle is the smallest and most agile—at least on land—of the marine turtles of Malaysian waters. It probably eats all kinds of food, seaweeds, shellfish and carrion. There does not seem to be any demand for its meat. The eggs are small. The nests are shallow and easily uncovered by dogs as well as humans. However, the nests are widely scattered both in range and on individual beaches. Its agility enables it to travel as far inland as the sand extends and it makes its nest in both hard and soft sand. Nests have been reported from widely separated sandy shores of all coasts of Malaysia. This makes it difficult to collect the eggs and place them in hatcheries, but it also means that collecting the eggs to eat or sell is correspondingly unrewarding, especially as the eggs are small. Therefore it is not easy to do much for the Ridley, but it may be less acutely threatened; even so the numbers seem small.

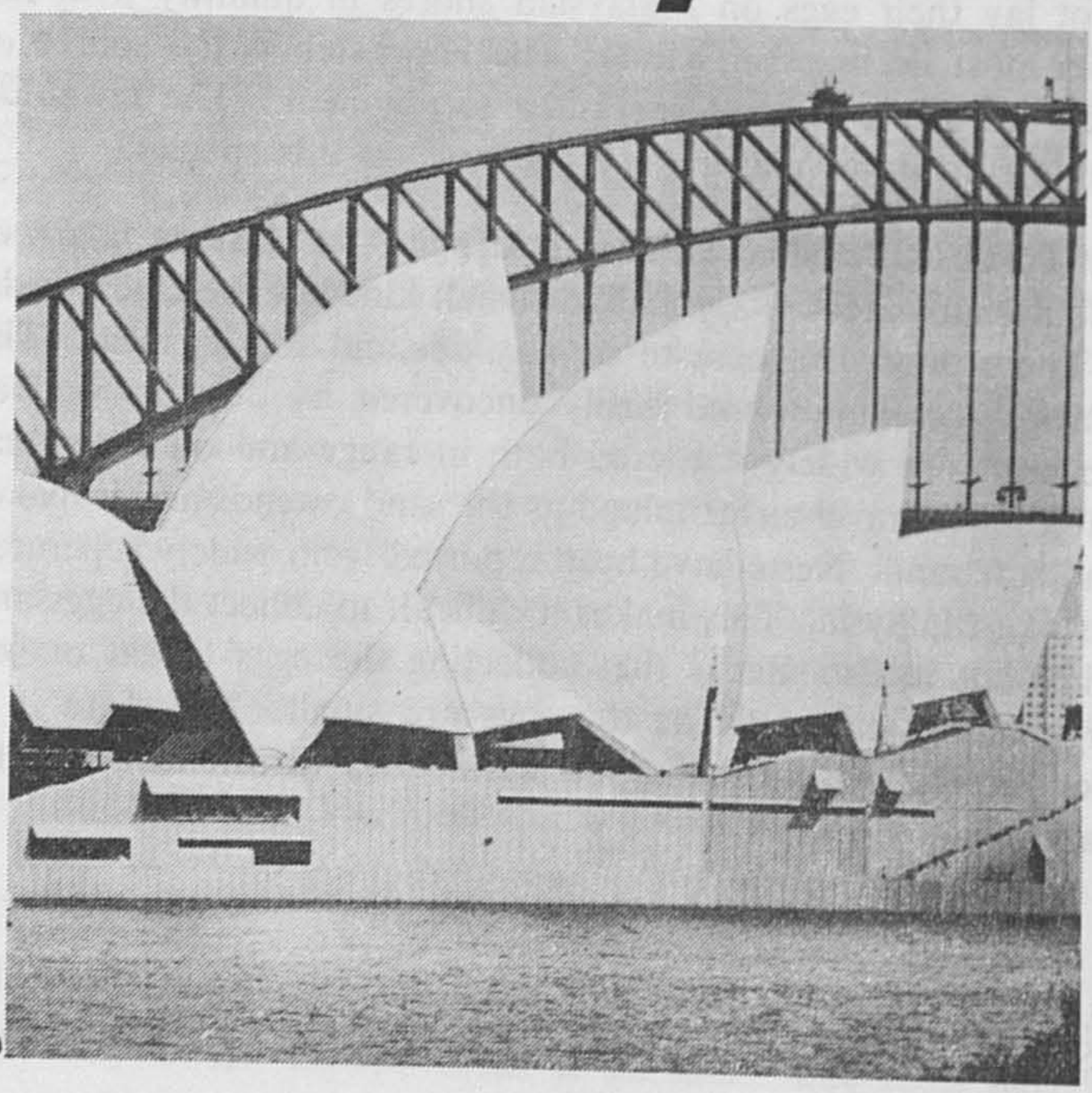
Philosophy of Marine Turtle Conservation

The female turtle comes ashore and digs a hole on a sandy beach above the usual high tide level. She deposits a clutch of eggs in the hole and then covers over



AUS

Australia: Fly Qantas 747B



Fly the big one... Qantas 747B to Sydney and Melbourne any Wednesday or Saturday at 6.35p.m. to arrive in Sydney at 7.35a.m. next morning or in Melbourne at 9.55a.m.

See your Travel Agent for Qantas bookings

QANTAS

Australia's Overseas Airline

Qantas with Air New Zealand · BOAC and SIA

the nest and returns to the sea. Some two months later the eggs hatch and the young hatchlings scramble up through the sand, make their way down the beach and into the sea. Humans may collect the eggs for eating as they are laid. The hatchlings run the gauntlet of crabs, dogs and seabirds on their way down the beach. In the water they are preyed upon by sharks and other carnivores and by seabirds if they swim near the surface. They are more agile in the water than on the beach, even so predation must be severe. Clutches of 50 to 100 eggs are laid, each female probably lays several clutches in a season, as many as six have been recorded. Thus quite large numbers of eggs are laid to allow for the many natural losses if the population is to be maintained.

Not all beaches are suitable for turtles to lay their eggs. Firstly they are confined to the warmer regions because the eggs are left to incubate at ambient temperature, unlike a bird sitting on its nest. The turtles cannot dig through sand which contains too much gravel and pebble. The nest must be high enough above high water mark not to be flooded, however, on many beaches sufficiently high sites are too far up for the larger turtles to reach them, especially if the beach slopes steeply. Also these high sites may have too many tree roots liable to prevent the turtle digging a hole with its rear flippers.

Nevertheless there are many beaches which appear suitable, but turtles never come to them. Some beaches used to be visited regularly by turtles, but all the eggs were collected year after year and/or the females were slaughtered for their meat, now no turtles visit them although the species concerned are not yet extinct throughout the world. This suggests that the turtles return to lay their eggs at the place where they hatched. This has been demonstrated in various migrant fishes and birds by respectively tagging fins or fixing numbered aluminium bands on the legs of the birds. It is very difficult to mark turtles by these methods, because the hatchling may increase two to ten thousandfold in bulk before it returns as a laying mother. A big and strong enough marker to last several years would be a severe handicap to a young turtle. Plastic tags clipped on the flippers are satisfactory for adults.

Therefore, if human activity either renders the beach concerned unsuitable as an egg laying site, or destroys the population of turtles either as adults which return to the beach or as eggs whose hatchlings would return to the beach, that site is lost for ever as a breeding ground. The only exceptions are that, provided the beach is still suitable, some female turtles stray in and are better treated than their forebears, or clutches are transported to the beach to re-establish nests whose hatchlings enter the sea from that site. The former does not seem to happen; there are still too many hungry people waiting on shore for the stray, and the latter does not seem to have been tried.

The philosophy of turtle conservation has the following elements. Firstly to protect the female adults coming ashore to lay their eggs. Next to collect the eggs and to save a proportion of them for a protected hatchery, allowing the remainder—usually the majority where there are enough—to be sold for human consumption, this latter retains the sympathy and interest of the local people who would otherwise

eat all without thought for the future. The proportion of eggs saved are transplanted to a hatchery of artificial nests. Ideally the hatchery should be in the most suitable part of the beach so that on the average the nests do better than if left to nature. Work is going on also to determine the optimum clutch size in a nest, so that clutches which are too large can be divided or too small clutches can be combined in one nest. The hatcheries are protected from terrestrial and avian predators.

When the hatchlings emerge, they must be conveyed to the sea with the least risk of loss, but also with the best chance of return. There are many arguments about how this should be done. There are three main methods employed.

(1) To allow the hatchlings to make their own way down the beach to the sea immediately after hatching, the only difference from nature being the presence of the hatchery supervisors to keep away predators.

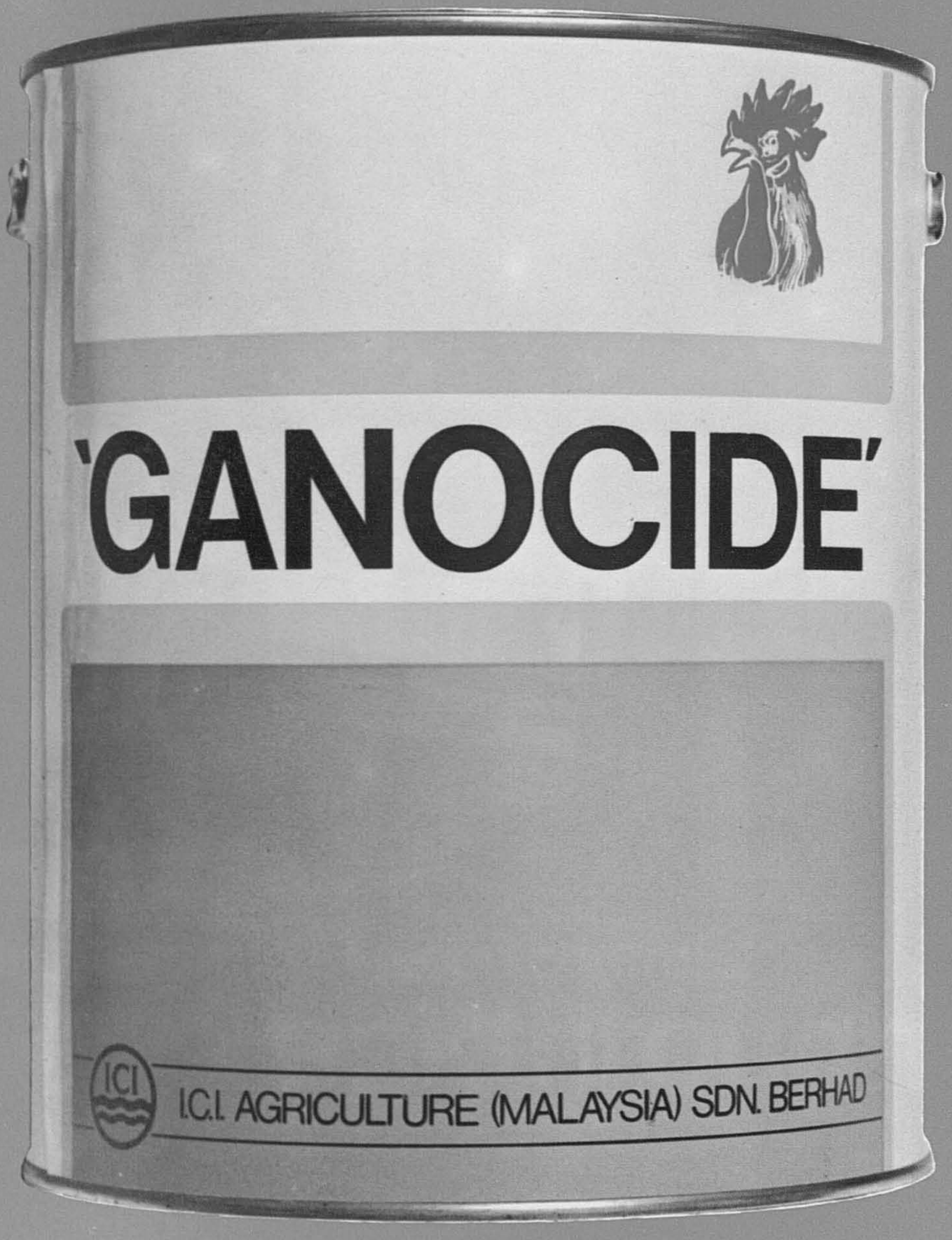
(2) To transfer the newly emerged hatchlings directly from the hatchery to deep water offshore.

(3) To keep the hatchlings in pools until their yolk-sacs are absorbed, providing artificial food such as grass clippings during the meanwhile, and then taking them out to deep seawater. Supporters of this method claim that the hatchling without its yolk-sac is far more agile and able to evade its predators. Against this skin-divers have observed that hatchlings with yolk-sacs are still remarkably agile.

In the author's opinion, method (1), the hatchlings scrambling down the beach under protection, should be adopted as the nearest approach to nature until one of the other methods is proved better. Proof will come when, either we can mark very young animals suitably and compare returns after release by the different methods, or different methods are tested over a period of ten or more years on otherwise comparable sites, the latter unfortunately being in short supply.

Those who study animal behaviour speak of imprinting, which means that certain specific experiences early in life will determine other specific actions later in life. If we are right that turtles 'home' to the beach where they hatched, we have a case of imprinting, hatching in a place seems to determine returning to the same site to lay eggs. However, the imprinting may be more crucial than that. It is seriously suggested that unless the young hatchling moves down the beach of itself as guided by obscure, instinctive forces, the female will not make the full return trip up the beach to lay her eggs. Perhaps she will discharge her eggs at sea if the need to come ashore above the high tide mark has not been imprinted on her by making the journey down the beach. We do not know, until we do perhaps it would be best to follow nature as closely as possible. Young hatchlings crowd on the seaward side of enclosed hatcheries after emergence. By instinct, they have the urge to return to the sea whence their mother came. If it is at all likely that eventually she, the adult from the female hatchling, will observe the same in reverse, then we must prefer method (1) to methods (2) and (3). Method (3) has the further disadvantages that while the hatchlings remain in a nursery losing their yolk-sacs, a debatable advantage, they not only become progressively separated from any chance

The new guard against red root disease



'GANOCIDE'

Get Ganocide And Stop The Rot

Ganocide the new collar protectant is available to protect your rubber trees against red root disease.

Ganocide containing drazoxolon (a new ICI-discovery wide spectrum fungicide) checks the fungus that retards the growth of your trees.

Field trials at the Rubber Research Institute of Malaya showed that Ganocide gives effective protection against the disease for at least 18 months.

ICI

'Cock's Head' agricultural products help Malaysia grow





In the battle of weed control...
a breakthrough

'Cock's Head' products help Malaysia grow

of imprinting but become adapted to an artificial diet. The main turtle conservation programmes in Malaysia will now be reviewed.

The Green Turtle

The adult Green Turtle, *Chelonia mydas*, is a vegetarian. Its flesh is the traditional constituent of turtle soup. Its eggs are edible like all other turtles' eggs. It is under constant pressure, including open sea hunting of the adults by power boats and excessive collection of the eggs for food. At present it has a wide range of nesting sites on island and reef-protected beaches around the South China Sea and to a lesser extent in the Indian Ocean. In Malaysia the major breeding colonies are in the northern part of the east coast of Malaya and on the turtle islands of Sarawak. The turtle conservation programme of longest standing in the region is that in Sarawak for the preservation of the Green Turtle which was initiated by the Sarawak Museum and continued by a Turtle Board. The numbers of turtles have continued to decline, which may be due to excessive open sea fishing with large nets by firms operating power boats from distant countries, or to the initial choice of method (3) above as the mode of release. More recent programmes in Kelantan use Method (2). If the wrong method of release is being used, the conservation programmes may be ensuring the extenction of the animal, because the majority of the eggs are eaten and the hatchlings from the rest may never return to lay. Until Green Turtles are re-established, the taking of them for meat should be discouraged by international agreement.

Leathery Turtles

These are the largest marine turtles and differ in that the shell is leathery instead of consisting of 'tortoise-shell' plates. Luth is the common name and *Dermochelys coriacea* is the scientific name. The Luth is carnivorous or perhaps a scavenger. Poisoning of humans eating its flesh has been reported. It is not normally taken for food. It used to nest in the West Indies, in Ceylon, in New Guinea and at various places on the Thai and Malay peninsula. The only large breeding site known today is that near Dungun on the east coast of Malaya. Until about 1950 there was no metalled road connecting this part of Malaya with the rest and it was not until 1964 that the last of the ferries was replaced by a bridge. Hence information has been lacking owing to isolation.

The village elders claim that 50 years ago many more Luth came ashore at Rantau Abang to lay their eggs and that the population has declined. This would be in accord with experience elsewhere. The villagers admit that they have been collecting turtles' eggs for as long as they can remember. Since 1947 those collecting eggs have been licensed and paid the government fees up to $25 000 per year. From the cost of eggs in the market it can be reckoned that during the years when high fees were paid at least 300 000 eggs must be collected to pay for the licenses alone, which is a third to a half of the probable total of eggs laid each year. The inference is that the licencees collect every egg to make a living. In 1951 the Turtles Enactment was extended to the State of Trengganu, but the purpose of this seems to have been to regularise the collection of the license fees by the government and not to afford any greater protection to the animal.

ONE SHOT TREATMENT

for **Pink Disease**

IN RUBBER

APPLY

®CALIXIN

A READY-MIXED SYSTEMIC FUNGICIDE
COPPER FREE
TREATED AREA WILL BE PROTECTED FOR 2-3 MONTHS
WITHOUT AFFECTING THE LATEX QUALITY

Sole Importers:

bm
BEHN MEYER

BASF

BASF 1865

SINGAPORE • KUALA LUMPUR • IPOH • PENANG

® Registered Trademark of Badische Anilin-& Soda-Fabrik AG. Ludwigshafen am Rhein/Federal Republic of Germany

In 1952 a zoologist identified the turtles of Rantau Abang as the Luth and published a report suggesting that since egg collection was local there was no risk. Collection could only be local, because nearly all the Luth are concentrated on $7\frac{1}{2}$ miles of beach. To the north the sand spits run northward and to the south southward, this seems to be the stable centre of the beach system. The slope is not too steep for these large turtles. Following this report on the Luth's egg-laying, but without any emphasis on the virtually total egg collection in progress, further popular accounts appeared in the illustrated press. These and the opening up of the east coast road brought tourists in large numbers, many of whom rode on the turtles' backs and frightened them and prevented them from laying their eggs.

Since 1961 a hatchery has been in operation under the aegis of the Fisheries Department and the Trengganu State Government at Rantau Abang. The scheme was initiated by the Malayan Nature Society and the University of Malaya; zoologists from the latter are studying optimum clutch size, the siting of the hatchery and mode of release. Release method (2) is used, however; if there is no evidence of Luth returning in quantity soon, a change may be made. During the first 5 years over 50 000 eggs were transplanted and more than half of these have produced hatchlings which were released at sea.

The tourists have also been brought under a measure of control by the issue of leaflets instructing them how best to observe the turtles and warning them that it is an offence to disturb the turtles. The bulk of the eggs, (99%) are still consumed as food and provide 50 tons of first grade protein each year, the annual requirement of 2 000 people. If the hatchery technique and the release method can be improved and the effectiveness of the entire operation demonstrated, then the following will have been achieved.

1. A rare species will have been saved from extinction
2. Protein will have been provided for those who need it
3. Tourists will have been provided with a fascinating spectacle
4. Government will obtain revenue from licences and tourism.

It will then be time to consider transplanting clutches by air to the beaches which used to have breeding turtles in other countries. There is no reason why other countries should not re-establish their turtles and operate them in a similar way. If the world survival of Luth depended on one beach in Trengganu, and some natural disaster such as a tidal wave swept away that beach or the development of the Malayan east coast brought in fouling with oil by shipping, then habitat destruction would have overtaken excessive collection in forcing the Luth into extinction. Therefore the old breeding sites should be revived so that the risks are more widely spread.

Freshwater Turtles

The most common freshwater turtle in Malaysia is the Mud Turtle, *Trionyx cartilagineus*, of the soft-shelled turtle family. It is widely distributed in swamps and

in slow-flowing rivers. The eggs are rather small and are not much sought after. The flesh is sometimes eaten. It does not seem to be seriously threatened, partly because it is widespread, partly because there is no great demand for the flesh or eggs compared with other species, and finally because it can inflict a severe bite.

The Mud Turtle lies in the mud waiting for fish and frogs to come within range when its head shoots out on its long neck and seizes its prey. If disturbed by humans or dogs it usually withdraws its head and then suddenly extends it to give a heavy snap of its powerful jaws. The long flexible neck enables it to reach back almost as far as its rear limbs.

River Terrapin

The Malay name *Tuntong* is applied to all the larger river terrapins, but the main species is *Batagur baska*. The largest nesting area is on sand bars between 40 to 60 miles up the Perak River. The number of eggs laid each year has fallen drastically from nearly half a million 30 years ago to only one twentieth of that number most years now and some years there are even less. The eggs are fairly large with a harder shell than the marine turtles', the flavour is the most highly prized of all. According to law only licensed egg collection is allowed. The licensee is allowed to keep one third of the eggs collected for his own use or for sale, one third are sent to the Sultan and one third are to be re-buried in a hatchery. The hatchery is meant to be guarded and the hatchlings should be reared until they are large enough to be safely released. The licensees can claim refund for green vegetables purchased to feed the young hatchlings.

Despite this legislation, of which the original dates from 1915, and the earlier protection of the river terrapins as a royal preserve, the population has declined severely. There are several reasons for this. There are many poachers who steal the eggs from the licenced areas and never place any in a hatchery. It is also dubious if all the licensees are conscientious in their duties concerning saving one third of the eggs for the hatchery or in operating it properly. Also the licensees are ordinary village folk and may not know how to run a hatchery; by selecting a convenient site they may choose one which is unsuitable due perhaps to water-logging. The young hatchlings are easy prey and need protection from the sun also. The method of release required by law, rearing the hatchlings until they have grown is similar to method (3) for the marine turtles, although after rearing the terrapin hatchlings are sometimes allowed to scramble into the river instead of being carried out to deep water.

Therefore the pioneer legislation on turtle conservation in Malaysia is probably failing for two main reasons. Firstly it is not being properly observed and enforcement is necessary. Secondly there is doubt if the hatchery methods enjoined by the law are the best, either to ensure that the clutches are re-buried in the most suitable manner in well sited hatcheries, or that the method of release is biologically sound to cause the females to return to lay. The Game Department is endeavouring to enforce the law and to carry out the much needed research to improve hatchery technique for the river terrapin; however, the resources which can be devoted to this are slender and still inadequate. More public support is needed.

There are about ten other species of terrapins in Malaysia spread widely throughout the rivers of the region. Very little is known about their status. Perhaps they are not seriously threatened because their nesting sites are too widely scattered for systematic egg collection.

Land Tortoises

There are three species of land tortoise in Malaya, none of which seems to be seriously threatened, although only one is common. They live in hill forest and are free from egg collection or molestation at present.

Crocodiles

The estuarine crocodile is a large carnivore of mangrove swamps, the lower reaches of rivers, some inland lakes and mining pools in the lowlands. It is a danger to man and domestic animals; however, the excellence of its skin as high quality leather is the main reason why hunting has now severely reduced its numbers. Fear of crocodiles results in little sympathy for their fate. They probably play a useful role by controlling excess pig and monkey pests in the mangrove fringes of cultivation, which may be compared with that of the big cats inland.

If crocodiles become extinct, or at least they are hunted out of existence in Malaysia, a source of revenue will have been lost. In other countries experimental farms have been set up to rear crocodiles, both for their skins and for their flesh. Perhaps one of the most fearsome animals will be saved from extinction by captivity even if not complete domestication.

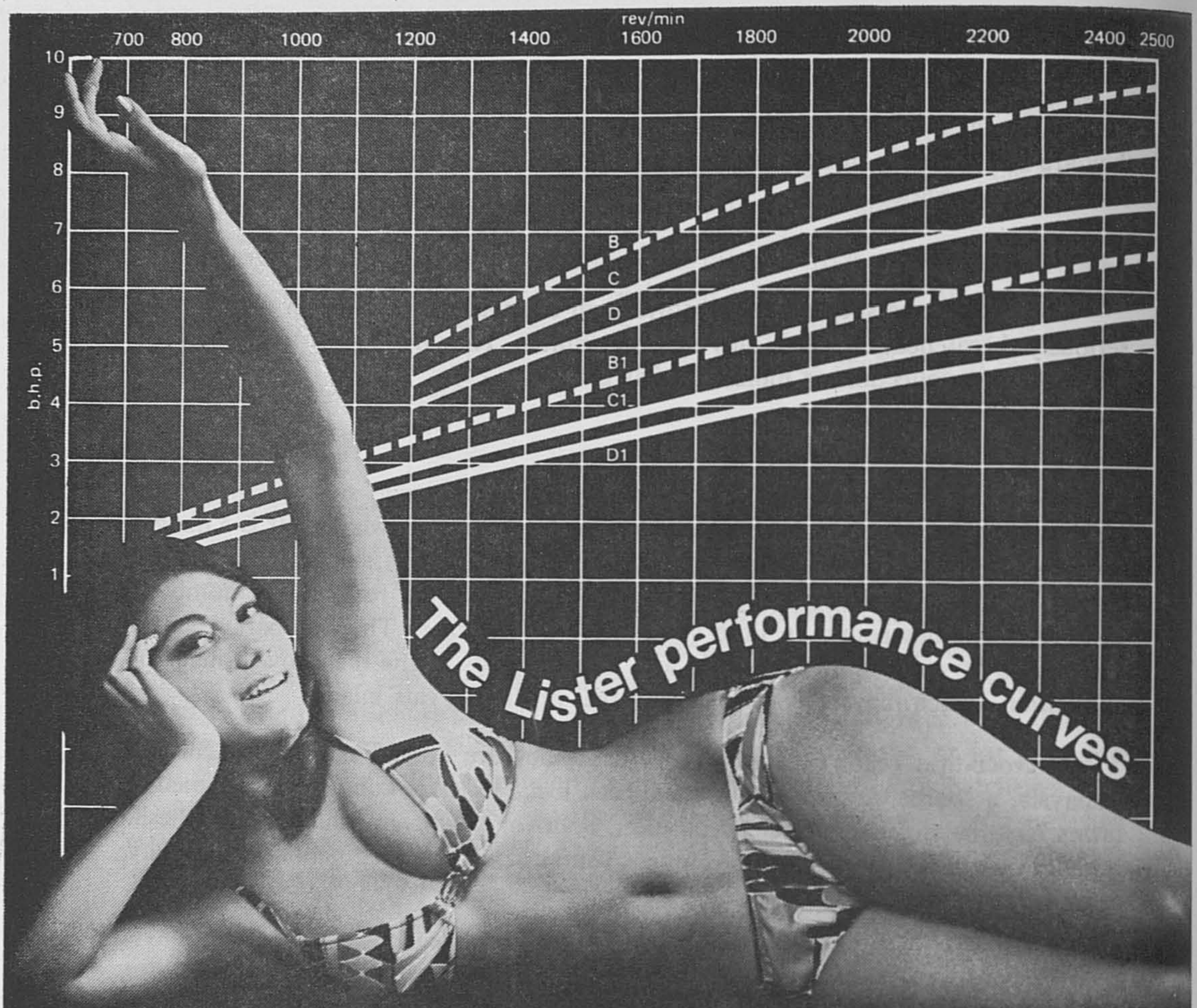
Gharials

The Gharial (*Tomistoma schlegeli*) has a more slender snout than the crocodile. The Gharial is confined to freshwater. Although carnivorous, eating fish, the Gharial has not been known to take human life or attack even goats among domestic animals. Not much is known of their numbers, but Gharial are probably on the decline because they are mistaken for crocodiles.

Monitor lizards

The large lizards have some superficial characters in common with the crocodile and its relatives, but they are actually members of distinct groups. Monitor lizards are now under pressure too, for their skins which are known in the trade as 'lizard skins'. The demand is growing as crocodile skin becomes more difficult to get. About 40 000 monitor lizard skins are exported from West Malaysia each year.

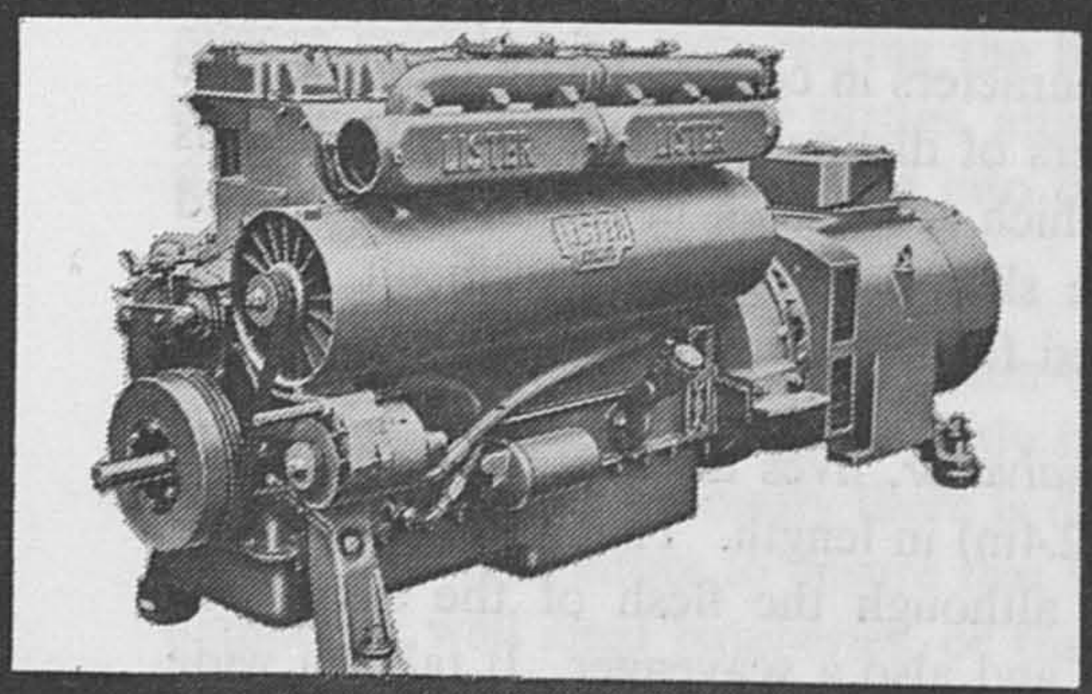
The Common Water Monitor, *Varanus salvator*, lives near streams and rivers widely throughout Malaya. They attain 8 ft (2.4m) in length. The largest specimens are those most often killed for their skins, although the flesh of the smaller is perhaps more readily eaten. It is carnivorous and also a scavenger. It takes a wide range from shell fish, birds and reptiles' eggs to small birds and mammals including domestic poultry. Like all predators it can be a destroyer of domestic animals when it gets out of control, but predators also play an important part in the control of



Not the sort of thing you normally see in a workshop. But, look at those curves, they're telling you something about Lister diesel engine performance. You can't understand them? Don't blame you!

Let us put it this way. Those curves are a proof of Lister performance. High output at economical running cost, and that's what an engine is about. That's what Lister is about!

Lister air or water cooled diesel engines are available for a wide range of applications and offer world wide service and spare parts.



To: Harrisons Lister Engineering Ltd., P.O. Box 1007, K.L.
Please send free no obligation brochures and information on Lister Diesel Engines.

Air Cooled ☐ Water Cooled ☐ Horse Power ☐

Name: .....

Address: .....

.....

For further information on Lister diesel engines contact:

HARRISONS LISTER ENGINEERING LTD.

KUALA LUMPUR · SINGAPORE · PENANG · IPOH

other animal pests such as rats, which are far more serious pests and dangerous carriers of disease if they are allowed to multiply unchecked. Destruction of large lizards and snakes may give rise to such a situation.

Marine snakes

There are about 20 species of sea snakes in Malaysian waters, all of which are venomous, that is their bite is poisonous due to venom injected from hollow teeth or fangs into the wound. The sea snakes or Hydrophiidae are recognised by the strong lateral flattening of their tails. Their bite is relatively painless, but the venom is very strong in some species and fatalities are frequent among human victims. However, it seems that persons swimming in open water are seldom bitten. The majority of cases occur when the sea snakes have been trapped in fishing nets.

Only one Malaysian sea snake, *Laticauda colubrina*, the Amphibious Sea Snake, comes ashore to lay its eggs when these are at risk by destruction of the eggs or the nesting habitat. The Amphibious Sea Snake is the least dangerous of all. As far as is known the young of all the other sea snakes are born alive at sea, where they must run the gaunlet of their natural predators. These totally marine snakes come into conflict with man when caught in fishing nets, when the more poisonous sea snakes frequently have the best of the encounter.

Even if one wished to exterminate sea snakes, there is very little prospect of doing so, unless drastic measures were used which would destroy most beneficial sea life as well. Moreover this would probably leave a greater abundance of many more dangerous sea hazards such as the larger jelly fish and perhaps some cone molluscs. In order to reduce human fatalities there should be better education of fishermen about sea snakes, how to avoid being bitten and what to do if bitten. Some modifications of fishing methods may help to reduce risks. Provision of first aid kits to treat for the shock consequent on the fear of death after being bitten would probably help, as might wider availability of suitable anti-venoms.

Land and freshwater snakes

The hundred and ten or more land and freshwater snakes in Malaysia may be classified into the following broad groups. 14 snakes of fresh, brackish and tidal water, these are all harmless. The others are 15 burrowing snakes, 18 arboreal snakes which live in trees and seldom visit the ground and 63 ground snakes. Most of the venomous land snakes are ground snakes, certainly all the dangerous ones are. The venomous snakes are 2 Cobras, 4 Kraits, 4 Coral snakes and 7 Vipers.

The two cobras are the most dangerous of all, the large King Cobra or Hamadryad is aggressive in defence of its brood and can inflict a massive dose of venom. The King Cobra is widely distributed in forest, it feeds on other snakes and lizards. The common Cobra feeds on rats, mice, frogs and toads. The control of rodents is an important service. Despite the dangerous nature of a Cobra bite, human deaths are not frequent.

Among the three Kraits, one is known to have rather weak venom, one has strong venom and the strength of the venom of the third is not known; however, in all cases of doubt it is safer to assume the worst. In practice the Kraits are not aggressive, biting if disturbed usually only if actually trodden on. The foot is most commonly bitten and ordinary foot-wear provides considerable protection. Anti-venoms are available.

The Coral snakes often have large poison glands and/or powerful venom, but they are unable to deliver a dangerous dose to humans because their mouths are too small and the fangs are located at the back of the mouth. The only records of humans being bitten are of a child's finger and the web of skin between a man's fingers. The Coral snakes are not aggressive; most are brightly coloured. Therefore it is very easy to see them and leave them alone, there is very little risk of being bitten.

The venom of all the snakes discussed so far is a nerve poison and fatalities are due to paralysis of the respiratory muscles. The venom of a Viper causes bleeding both internally and externally. Despite extreme discomfort death by Viper bite is rare. Some of the Vipers are arboreal. Many feed on rodents.

The danger of the venomous snakes is perhaps exaggerated. Many cannot bite a human under normal circumstances or are reluctant to bite. Nevertheless death from Cobra bite or a most unpleasant experience from Viper bite are risks. Malnutrition lowers resistance to snake bite. Shock is the immediate effect of snake bite, treatment for this is the first aid, to be followed by anti-venom if necessary. Snake venom is now being used experimentally to treat thrombosis, even coronaries. If snake venom provides a cure for thrombosis, thousands may have reason to be glad that the fear of snakes has not resulted in their extinction before this discovery could be made.

Many snakes both venomous and harmless feed on rodent pests, some burrowing snakes feed on termites. These are important useful functions. It is quite understandable if Cobras, Kraits and Vipers found near human dwellings are killed. However, the wholesale destruction of all snakes, the majority of which are harmless and many harmless species are found in homes and gardens, only increases rodent pest problems. It is this attitude which is a threat to useful snakes. A few such as the python are killed for their skin, flesh or because they are poultry raiders. In general, land snakes play a useful role in the natural balance.

Freshwater fish

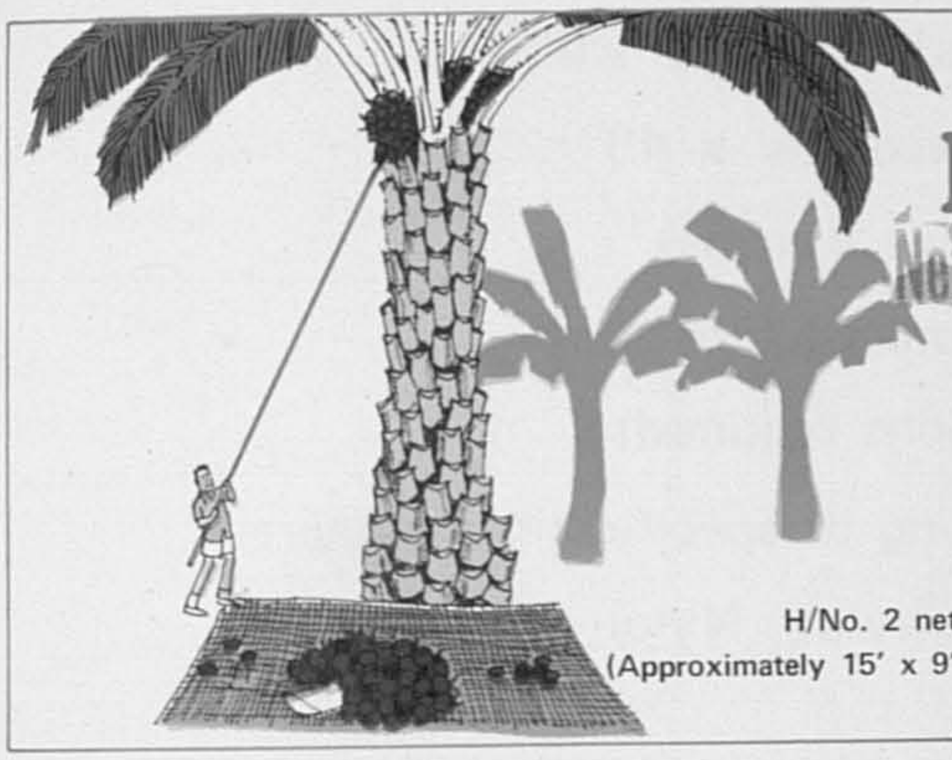
The rivers form the traditional route in this region to resume our journey from the sea to the forest. Until modern times the rivers were the main means of transport and settlements spread along their banks. Leaving the estuarine mangroves with their rich shell-fisheries, we enter the realm of freshwater: —rivers, streams, lakes and ponds, irrigation ditches and rice-fields, reservoirs and mining pools. Freshwater fish are an important source of protein. Some of the smaller species—unsuitable as food—are much prized by aquarists. Freshwater fish are thus both an important food resource in protein-hungry areas and a wildlife treasure appreciated all over

TIME ! **To take the advantages of the new Discovery**

for YOUR ESTATES and start with

"THE NET-COLLECTION-SYSTEM"

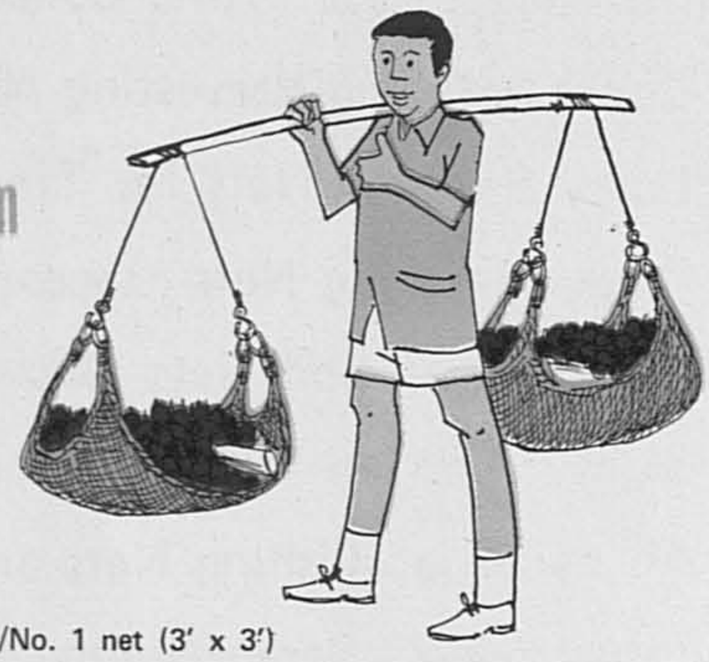
NOW ! 1973



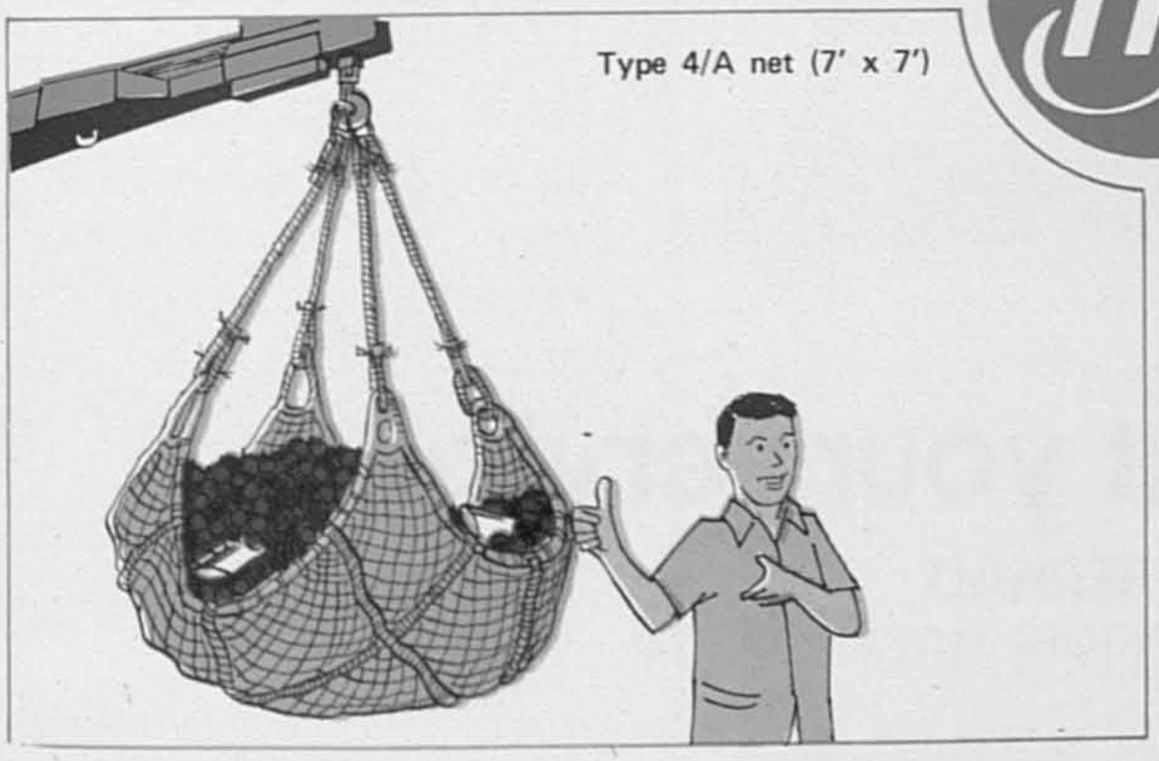
FUSAN

Net-Collection-System

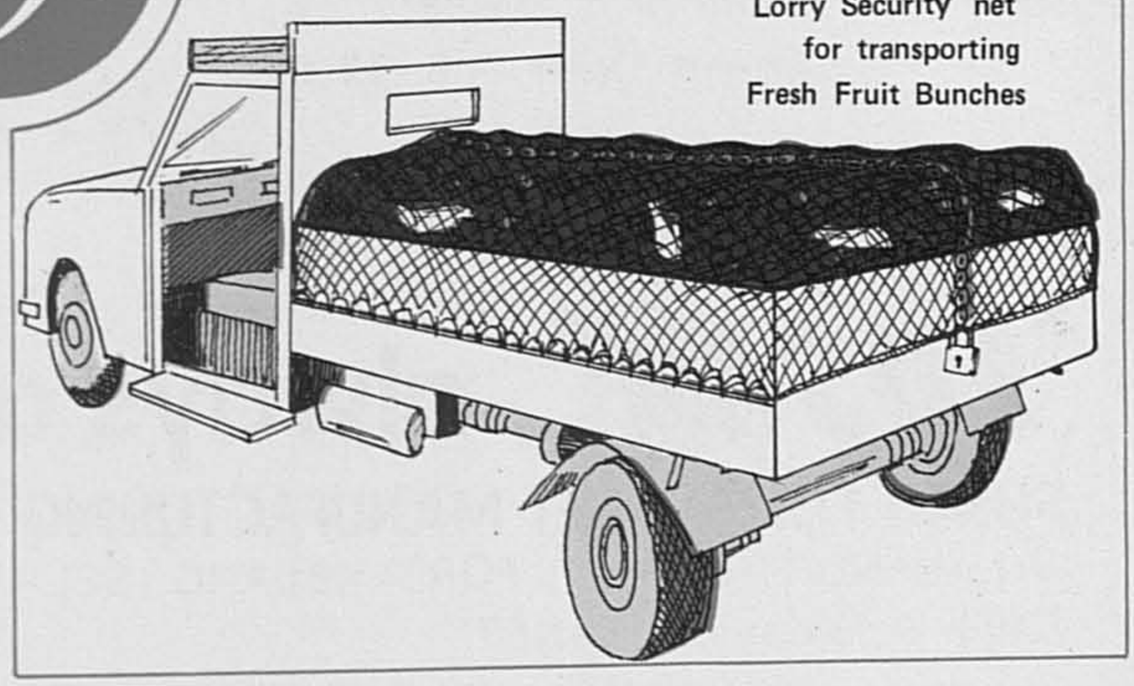
H/No. 2 net
(Approximately 15' x 9')



H/No. 1 net (3' x 3')



Type 4/A net (7' x 7')



Lorry Security net
for transporting
Fresh Fruit Bunches





Stamp

To
FUSAN FISHING NET MFG. BHD.,
JALAN NORTH PORT,
PORT KELANG,
SELANGOR,
MALAYSIA.

Products Manufactured :-

Items

(1) Oil Palm Fruit Loading Nets (7′ x 7′) Type 2/A, 4/A

(2) Oil Palm Fruit Harvesting Nets (3′ x 3′) H/No. 1.

(3) Oil Palm Loose Fruits Collection Nets (Approximately 15′ x 9′) H/No. 2

(4) Cocoa Loading/Harvesting Nets for pods and seeds (4′ x 4′)

(5) Lorry Security Nets for Transporting Fresh Fruit Bunches

(6) Cargo Handling Nets (according to specifications required)

(7) Cargo Separation Nets (according to specifications required)

(8) Safety Nets for Building Construction (according to specifications required)

(9) All types of Fishing Nets and Ropes made of Nylon, Nylon Monofilament, Polyethylene, Saran/Nylon, Kuralon, Teviron.



Trade Mark

Delivery:- Ex-stocks — Prompt

Against Order — 8—12 weeks.

'FUSAN' -always at your service.

FUSAN FISHING NET MANUFACTURING BERHAD
JALAN NORTH PORT, PORT KELANG, SELANGOR, MALAYSIA. Tel: 6032, 6033, 6035.
Cable Address: "FUSANET"

Date.....

I am interested in your items Nos:- ..... for which please send to me:-

Your free Brochure with description of the Net-Collection-System and your Fruit Loading nets etc.

Your Free Sample cutting of Item.....

Your ex-factory quotations for

Item..... for.....pieces required

Item..... for.....pieces required

Item..... for.....pieces required

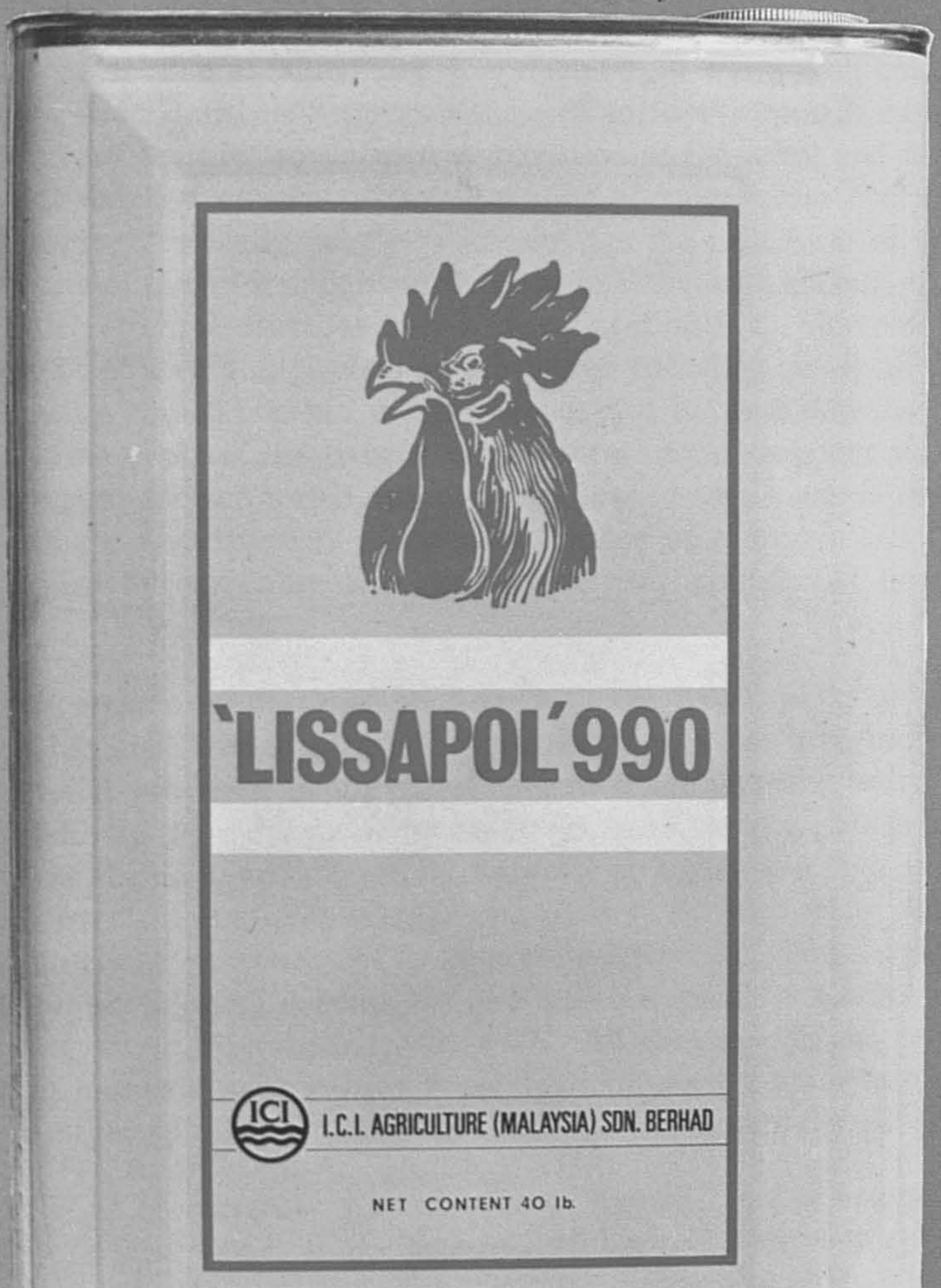
Name:.....

Address:.....

.....

.....

REMEMBER



LISSAPOL 990 now with a new look

Now Lissapol 990 has a new look to mark its return.
Lissapol 990 is the highly efficient non-ionic surfactant
you can depend on to make your spray cling as it spreads.
It improves the herbicidal properties of your weedkiller.
It's a good detergent too.

Remember to ask for Lissapol 990, available in 10-lb.
and 40-lb. tins as well as in bulk packing of drums.

'Cock's Head' agricultural products help Malaysia grow

the world. Fish are relatively sensitive to pollution, their health and productivity is a measure of the water's ability to support life free from disease upon its banks as well as in its depths.

Most fish obtain the oxygen necessary for respiration by diffusion of dissolved oxygen from the surrounding water through their gills into the bloodstream. Since oxygen is not very soluble in water (and less dissolves in warm than cold water), large volumes of water must pass through the gills to supply enough oxygen. As a result fish are very sensitive to reduced oxygenation of the water and to poisons dissolved even at very low concentrations. Pollution of water means contamination with untreated sewage to many people. Although not the only form of pollution, this is certainly one of the most dangerous, because infection with cholera, dysentery, typhoid and other epidemic diseases may be associated with it. However, sewage is also an example of a very large class of substances, including nearly all domestic and industrial waste, which create a demand for oxygen in order that they may be broken down. This depletes the oxygen in the water, if this happens rapidly the fish normally present are suffocated and die. If a low oxygen status is maintained over long periods, a population of air-breathing fishes may survive and multiply. Water weeds killed by herbicides also use oxygen when rotting and produce the same effect.

Even when organic matter such as sewage, waste food, rubber or oil palm factory effluent has been treated before entering the river or has been broken down by natural bacterial processes in the water, the resultant inorganic salts may yet cause trouble, because these are the nutrients of plants. Excessive growth of water-plants can deplete the dissolved oxygen in the water at night when their respiration is not balanced by photosynthesis. The growth of large or small water weeds may be so thick as to choke waterways. Finally some microscopic plants, algae, which multiply rapidly or 'bloom' in enriched waters, can produce toxic substances dangerous to man or animals drinking the water. All these effects can result from large amounts of inorganic salts, especially soluble nitrogen and phosphate, reaching the water from other sources, for instance leaching of agricultural fertilisers.

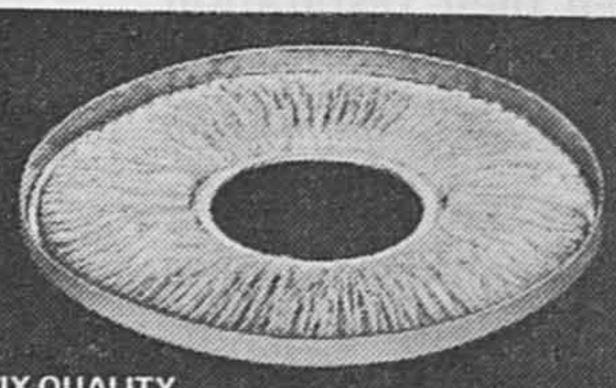
Small additions of inorganic fertilisers or of treated organic matter increase the productivity of freshwater. Large amounts during short periods or frequently applied lead to death of fish, producing foul and dangerous water. There are quite complicated methods of trying to restore conditions in polluted lakes and rivers, but these are expensive at best. Various methods of sewage, waste and effluent treatment and nutrient recovery have been devised. As well as the economic saving of nutrients, which would otherwise be wasted, these treatments must be applied before discharge into rivers to maintain the waters in a healthy and productive condition.

There are two other major sources of pollution, one of which has long been serious in Malaya and the other has hardly affected Malaysia yet, although there have been local catastrophes elsewhere. The first is the suspension of silt in the water. Silt is discharged by mines into rivers, and although there is legislation to limit the amount disposed of in this way, control is largely ineffective. Erosion of

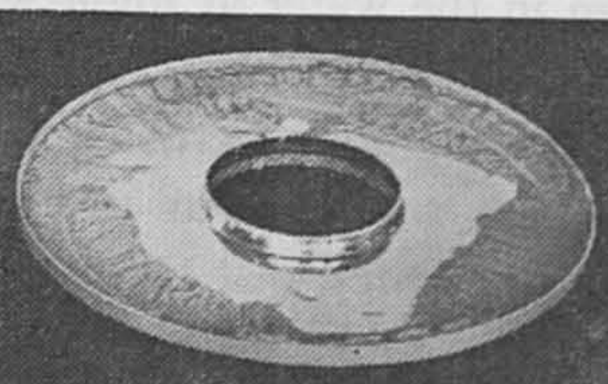
WIX QUALITY: A difference you can see! A difference you can save!



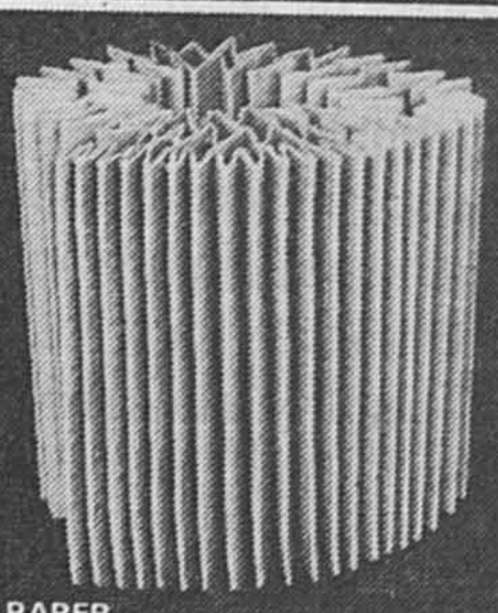
Do you know what filters do to your engine? Research has shown that only 10% of motorists know so don't be surprised if faulty filtration is costing you money and damaging your car. Specify a WIX Filter and avoid wasteful and premature parts change and expensive repair bills. The difference you pay for a genuine WIX replacement is little compared with the big savings you'll make on running expenses. Many motorists who keep on returning their car to mechanics for engine tuning, valve grinding jobs in an attempt to correct engine faults could save continual repair bills by insisting on WIX. There's a big difference between WIX quality and sub-standard back yard filters. **And these photos prove it!** That is why WIX proudly attach name & address on their carton:
You can trust WIX filters.



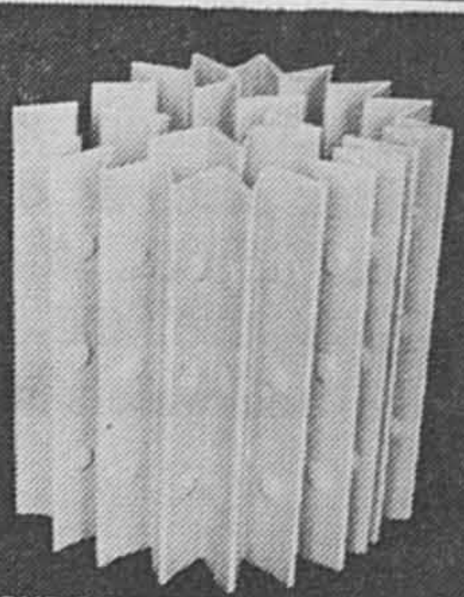
WIX QUALITY
Unretouched photograph of Wix filter end cap forcibly removed from the element. Each pleat of special Dacron reinforced filter paper is permanently glued. Any break in the seal renders the filter useless.



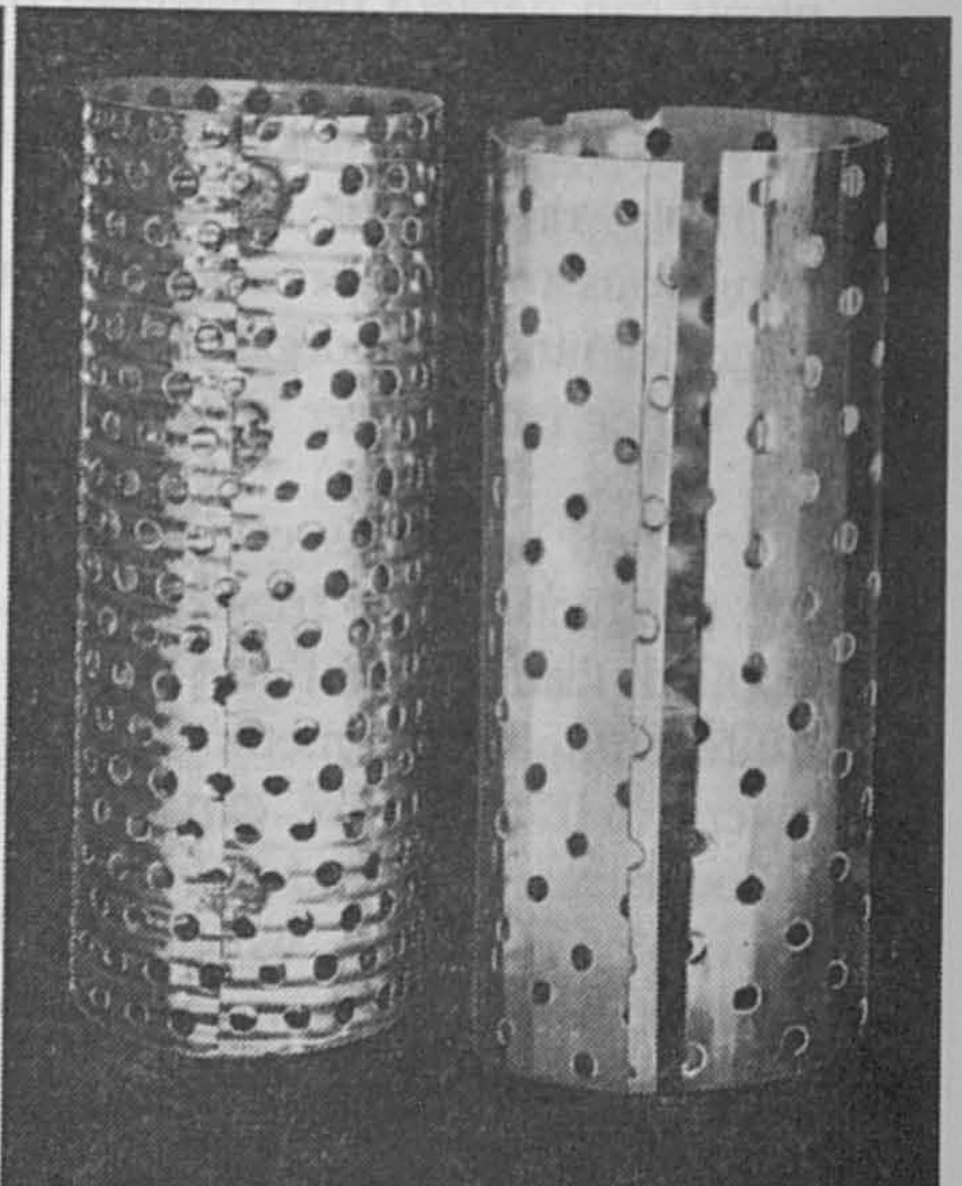
SUB-STANDARD BACK YARD
Unretouched photograph of cheap sub-standard back yard imitation. Glue used in this instance is ordinary furniture glue! These filters are non-functional from the start.



WIX FILTER PAPER
Wix engineers offer you prescription filtration from a choice of over 20 types of special USA manufactured paper with a permutation of 15 pleat sizes. Custom manufactured WIX Filters are Heat and Chemical Resistant and reinforced with Dacron, resin impregnated and corrugated to increase dirt carrying capacity and efficiency.



SUB-STANDARD BACK YARD FILTER PAPER
Filter paper of sub-standard product incorporate 'backyard' technology! This non-corrugated paper is dimpled and is only good for air filters, not oil filters. Average motor car engines develop some 40-50 lbs per square inch of oil pressure which is much too high for sub-standard filters.



WIX QUALITY
This is the heart of the filter elements. Wix put in spot weldings and corrugations to strengthen the component. This strength gives WIX filters the capacity to take oil pressures up to 100 p.s.i.

SUB-STANDARD BACKYARD
This is the weak heart of a cheap back yard filter element. Note the burrs face outwards and act as many knives cutting the paper.

COME CLEAN — fix a Wix filter to your vehicle and prevent engine failure, smoke belching, and unnecessary and expensive premature parts change. See your local spare-parts shop, garage or service station soon — before it's too late.

WIX CORPORATION S.E.A. SDN. BHD.
(A MEMBER OF THE UMW (M) GROUP) SOLE DISTRIBUTORS UNITED MOTOR WORKS.

soil from agricultural land, construction sites and badly conserved river-banks adds to the overburden. Silt clogs the gills of fish and, even if it does not always suffocate them outright, makes them more susceptible to reduced oxygenation. This is another reason for controlling soil erosion. The other danger is poisons contaminating the water due to mining operations. These are only locally serious to date. Persistent insecticides are a growing, more widespread risk. Their effects and means to reduce their hazards were discussed in an earlier section.

How bad is pollution of rivers in Malaysia? The lower reaches and indeed most of the upper reaches of all rivers in west Malaya and of an increasing number in east Malaya and Sabah have lost their sparkling, lucid quality and are visibly muddy especially when viewed from the air. A survey of the Gombak River in 1962 showed it to be virtually deoxygenated and unhealthily polluted where it entered the urban area of Kuala Lumpur. Pioneer surveys in Malaya and Singapore indicate that all rivers are seriously polluted downstream from all large urban areas and this is a situation which is deteriorating. Urgent preventive and remedial action is needed if the fish of Malaysia's rivers are to be conserved, either as a food source or as distinctive wildlife. Singapore has taken action earlier than the town across the causeway, but most visitors are still more impressed by the need than by the results.

Fish as Wildlife

The foregoing is concerned mainly with conserving fish as a food resource in an environment healthy for the associated human population. However, if the whole range of fish species are to be conserved for science, sport and aquarists, the different kinds of habitats must be preserved. The majority of Malaysian freshwater fish species are restricted to pools, rivers and streams shaded by trees, typically in forest. The mountain torrent streams in hill forest and at higher levels are relatively safe so long as the policy of protective forest above the 'steep land line' is observed. Some areas of swamp forest are likely to remain uneconomic to drain and so to provide refuges for their characteristic fish fauna. It is the lowland forest which is threatened with almost complete elimination by land development and with it habitats of the undisturbed forest stream and pool. Plantations do however provide shade for the streams when the trees and palms are fully grown. Although the typical forest fish fauna is lost at the time of clearing and the streams are exposed to full sun for 2–3 years, there is evidence of extensive re-invasion of the plantations by forest fish when the shade has been re-established.

Therefore so long as a large proportion of the lowland agriculture consists of plantations of palms and trees, there are prospects for the survival of the forest fish. However, the scale of land clearing operations is growing, which means also an increase in the average distance separating the forest and old plantation reservoirs of fish and the bulk of the new plantations, which must be re-stocked from them when adequate shade is re-established. Modern agricultural methods involve other risks to the fish. Insecticides very toxic to fish, fertilisers causing excessive plant growth, herbicides killing water weeds and causing an oxygen demand, may all leach into streams. If terracing has been done well, the successful water conservation

may dry out some streams, whereas poor terracing permits soil erosion and silt contamination of streams and a variable water status of drought and flood. This situation might be alleviated if patches of undisturbed forest were allowed to remain in the agricultural landscape as virgin jungle reserves or where the soil is locally unsuitable for cultivation as small parks. These will serve as centres for re-stocking. In general, agriculture based on resource conservation to prevent soil erosion, to maintain a steady water regime, to apply integrated pest control and to use more efficient methods of weed suppression and of fertiliser application, may give the best chance to the fish in the area.

The extension of rice cultivation, the construction of irrigation canals and the formation of mining pools have increased the habitats available to fish preferring sunlit water and they should flourish, if two hazards can be kept under control. The first is a wildly fluctuating water regime, which all good water conservation and utilisation schemes are designed to prevent. Secondly persistent or cumulative toxicity due to insecticdes sprayed aganst pests of rice. There is hope of reducing rice-pests by breeding resistant varieties of padi and the discovery of alternative insecticides, which may be encouraged if joint rice cultivation with fish culture is recognised as an integrated means of staple food and protein production.

Over-collection

The island of Singapore has relatively few species of fish compared with Malaya. The main depletion in the fish fauna has been due to habitat (forest) destruction. However, during the last 30–40 years further losses in the native fish species to be found in Singapore have occurred. These are less easily attributed to further environmental modification, but there is strong evidence here—as elsewhere—that excessive collection by aquarists is responsible. Education of the aquarists through their clubs and encouragement to breed rare and attractive fish in capacity, instead of collecting them from the wild, provide the long-term solution. Legislation and policing may assist meanwhile. Research on breeding and keeping of aquarium fish could be carried out in the universities and so bring the professionals and amateurs into fruitful contact.

Exotic escapes

Species introduced from other countries are called 'exotics' and those which become established in the wild are called 'escapes' from cultivation. Many plant weeds are exotic escapes and compete to the disadvantage of the native flora. The same can happen with fish, both ornamental species escaping from aquaria and edible species escaping from fish ponds. Game fish may be deliberately introduced for sport, but this has not been a success in Malaysia. Although exotics such as *Barbus semifasciolatus* (an aquarium fish) and *Tilapia mossambica* (a food fish of ponds) have escaped and multiplied in some areas, it is not certain that they have damaged the chances of survival of indigenous rarities, which may be vanishing owing to the more general habitat destruction and pollution. Yet with so much wildlife in a precarious state, fish-lovers such as aquarists and specialists in fish-production should be on their guard against worsening the situation. Artificial fish

ponds such as adapted mining pools and reservoirs are sometimes more easily managed so that exotic food-producing fish do not escape.

Legislation

Only the Giant Cyprinid, *Probarbus jullieni*, is considered to be a threatened species among Malaysian fish due to excessive capture for its flesh when on its spawning run up the great rivers of Pahang and Perak. As a result the reproduction of this never abundant fish is further curtailed by the growing human population. The only legislation to protect this and other fish prohibits fishing by means of explosives and restricts the use of the anesthetic *tuba* root (of *Derris*) to the Royal prerogative. The enforcement of closed seasons when fishing is prohibited to enable the fish to spawn and the licensing of fishing to limit the catch—the latter is observed only in Taman Negara—will prove essential. Such regulation, like that for turtles, is often readily accepted by the local people if the purpose of increasing fish stocks is adequately explained and some priority in concessions is allowed them.

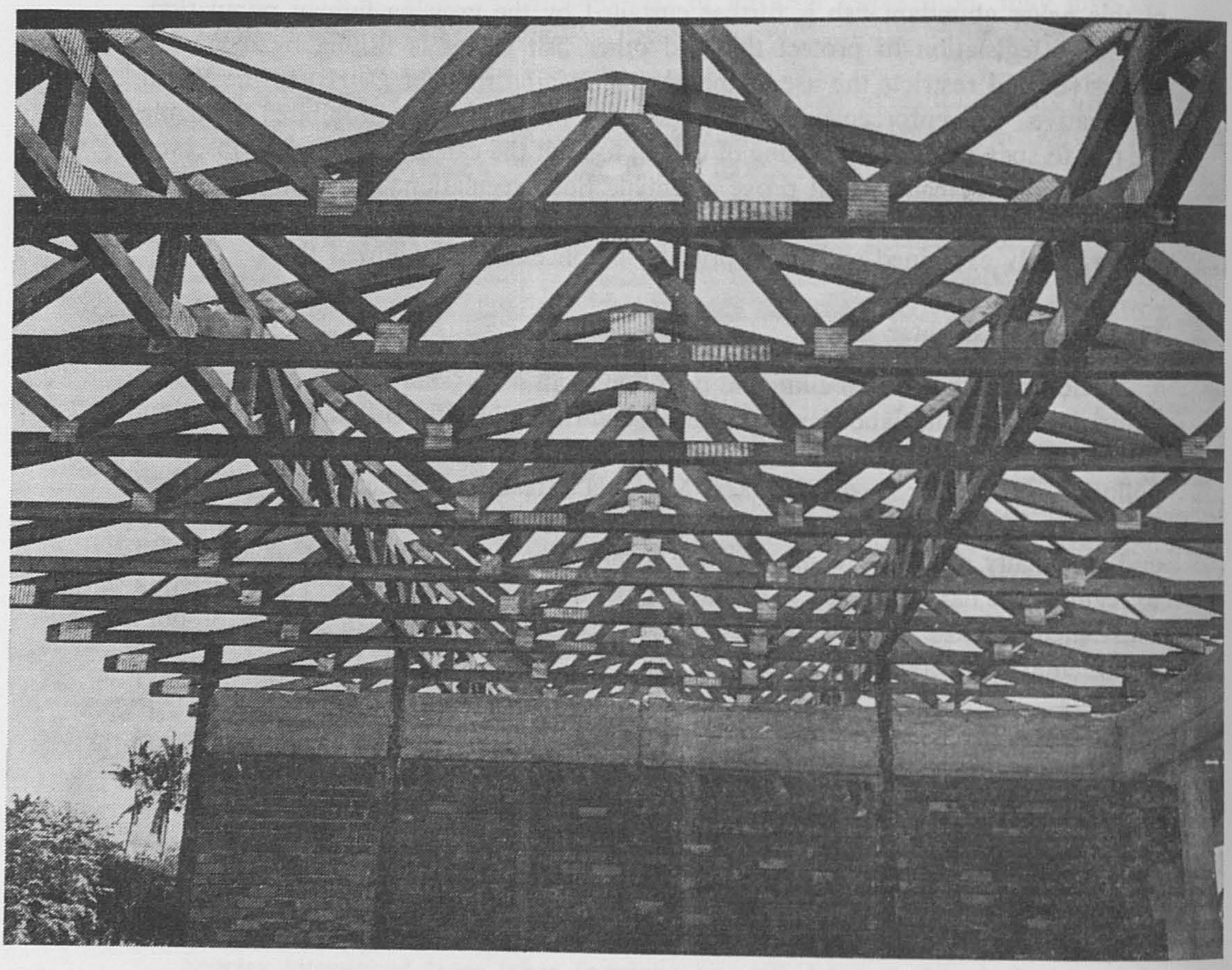
Future for freshwater fish

The urgent need is to eliminate pollution from Malaysian rivers. Urbanisation, industrialisation and land development all contribute in different ways to pollution. Experience in other countries has shown that it is never too early to prevent pollution. The other needs to protect Malaysia's freshwater fisheries and interesting fishlife are the preservation of a well mixed landscape, including many naturally and artificially shaded streams, and the formulation and enforcement of legislation to regulate the harvest of fish to obtain the maximum sustained crop. This legislation must include close seasons, licensing, restriction on liberation of exotics of both ornamental and food fish.

(*Next month:* *BIOLOGICAL COMMUNITIES* contd.)

GANGNAIL®

For design freedom in roofing



Gangnail trusses offer the ultimate in design flexibility, reduced construction time and minimal supervision. Gangnail trusses are custom built for spans up to 100 feet.
Full information is available from Hickson's.

Gang-Nail connectors are manufactured by Automated Building Components (Aust.) Pty. Ltd, and distributed by

HICKSON'S TIMBER PRESERVATION

HICKSON'S TIMBER PRESERVATION (MALAYSIA) SDN. BERHAD
Petaling Jaya • Ipoh • Butterworth

HICKSON'S TIMBER PRESERVATION (SINGAPORE) PTE. LIMITED
Singapore

HICKSON

The monthly crop

All you need to know about the Society's TES examinations (except the answers) starts on page 14.

Christmas and New Year greetings to the Chairman and members of the ISP have been received from the Chairman and members of the Ceylon Planters' Society and from the Director of the Rubber Research Institute of Ceylon.

Details have been leaked of Russia's supersonic MiG–23, still on the secret list and a most unusual aircraft if a press report, (*S.T.* January 6th), is to be believed: 'They (*the aircraft*) are said to be more vulnerable on take-off and especially on landing, when they have to slow down'.

A Society car badge was mooted at the last annual general meeting but the idea gained only lukewarm support. If its protagonists are still keen, perhaps we might have some suggested designs. In its day the old ISP Car Club badge served us well but now looks drab and uninspiring against the brighter colours of today's motor-cars, and anyway there aren't that many places where you can fit badges nowadays.

The First Annual National Conference of the Institution of the Rubber Industry is to be held at the Stratford Hilton, (where will they think of building one next?) Stratford-upon-Avon on 8–9 November. This conference is intended to be the major technical meeting of the British Rubber Industry during 1973 and the subject of the conference is TYRES.

An exhibition will be held at the same venue during the conference. A number of other social activities have also been organised taking account of the unique facilities afforded by Stratford-upon-Avon, and a special Ladies Outing has been arranged. If any member of the ISP who is likely to be in Britain in November and who would like further information about this conference will write to us, we shall be pleased to provide it.

Goodwill Circulars can be fun. A member has kindly sent us the following quote from one: 'I wish to draw your attention that the letter was overlooked by sertain erras and regret very much for the mistake.'

An appeal from the Acting Head Librarian of the University of Agriculture deserves a hearing. They have only four copies of Roger N. Hilton's book *Maladies of Hevea in Malaya*, to be shared among 800 students. This book is out of print and no further copies are available for sale from the RRIM, its publishers. If any ISP member has no further use for his copy, the University would be most grateful for it. At a pinch they are prepared to pay. Please write to Universiti Pertanian, Peti Surat 203, Sungai Besi, Selangor.

Illegal strike action is at last receiving a positive reaction from the Government. The Chemical Company of Malaysia (CCM) dismissed an official of the National Union of Petroleum and Chemical Workers for alleged involvement in a recent strike in the company. The strike was illegal since it did not have the sanction of the unions executive council, and the Registrar of Trade Unions deregistered those union members who took part in it.

On 30 October the Registrar ordered both this union and the National Union of Drinks Manufacturing Industry Workers to expel some 200 of their members who had struck in contravention of union rules. He said: "By not following the union rules and taking strike action without the executive council's sanction, the workers have committed a very serious offence. We cannot have a situation where the union has no control over its members and neither should union officials take action without the concurrence of members." Under the Ordinance the expelled members cannot rejoin the union without the Registrar's permission.

A footnote to a recent letter from a secretary read 'Encl: copy of daft minutes'.

HAVE YOU PAID YOUR SUBSCRIPTION

TO THE SOCIETY FOR 1973,

DUE ON THE FIRST OF JANUARY?

IF NOT, PLEASE DO SO AT ONCE, AND CHECK THAT YOUR REMITTANCE CONFORMS TO THE SUBSCRIPTION RATES LISTED ON PAGE FACING CONTENTS PAGE.

PROBLEM WITH WEEDS?

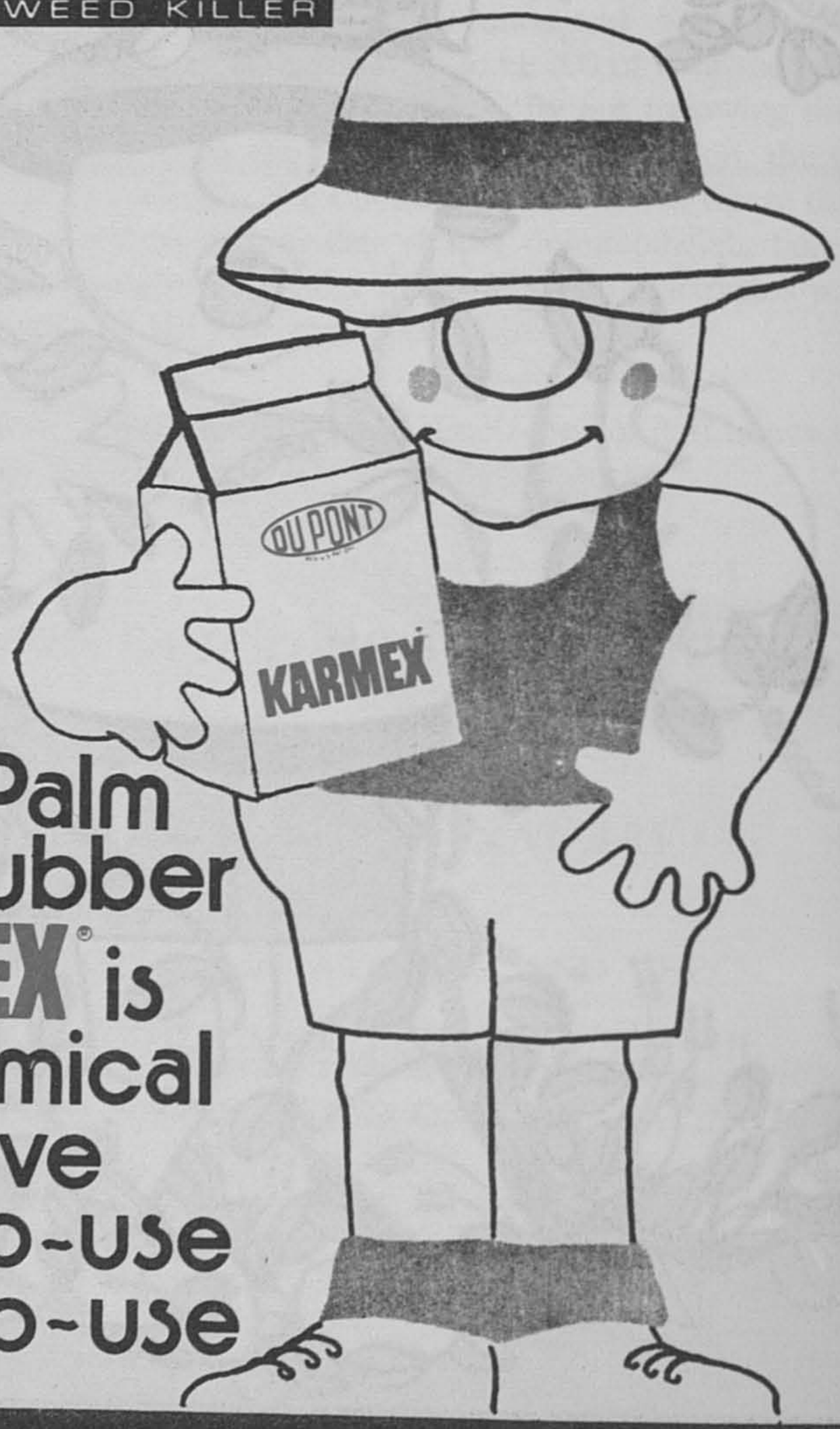


Weeds cost you MONEY
when you let them grow.

DUPONT
REG U.S. PAT. OFF.

KARMEX®

DIURON WEED KILLER



In Oil Palm and Rubber KARMEX® is

Economical
Effective
Safe-to-use
Easy-to-use

Control unwanted weeds and grasses with KARMEX® diuron weed killer.

GUTHRIE WAUGH

® Registered trade mark E I Du Pont de Nemours & Co Inc. Wilmington. Delaware U S A

Most excavators have some JCB features...

ONLY JCB HAS THEM ALL.

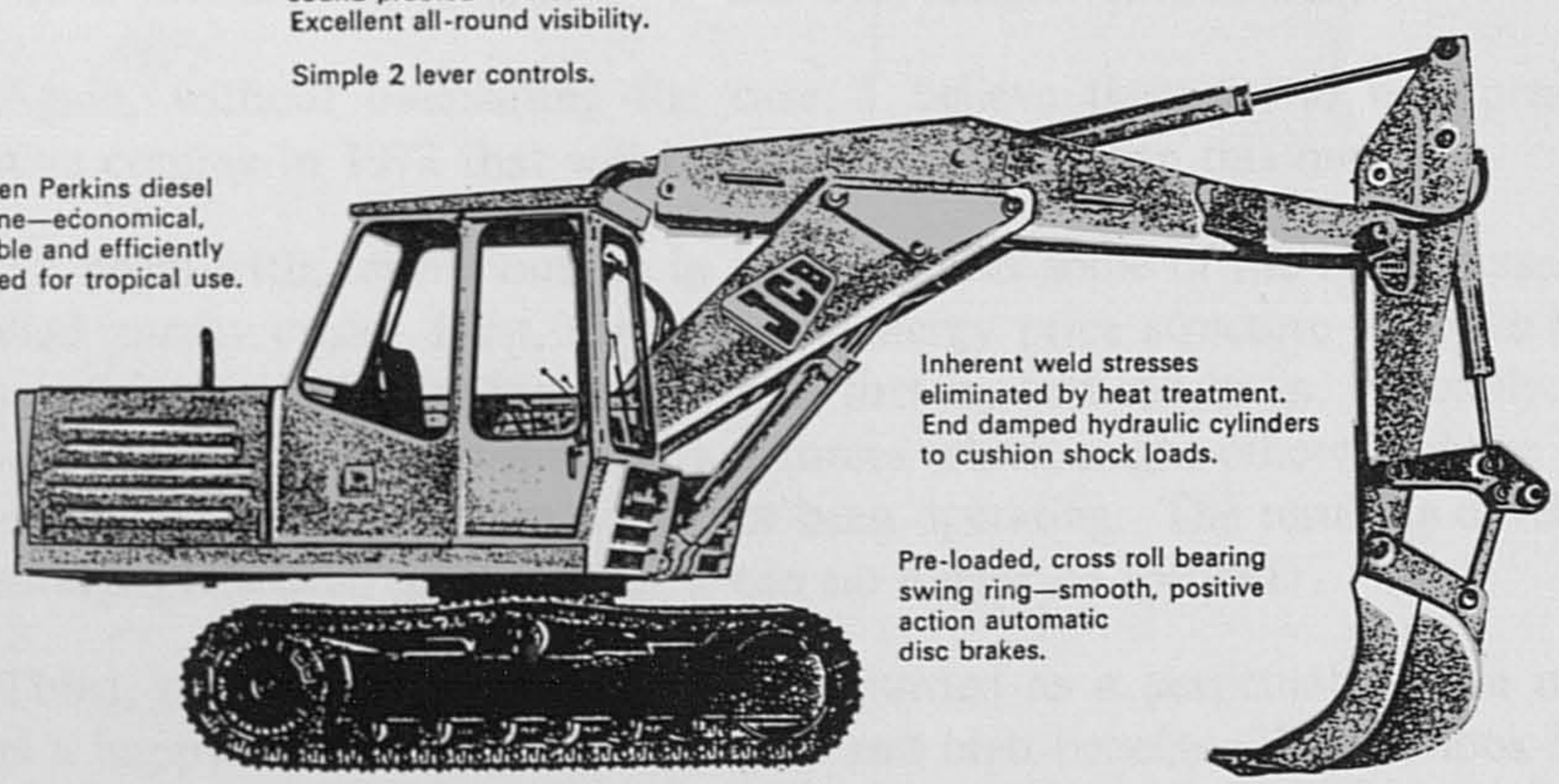
Check this:

Complete operator comfort—luxurious, sound proofed well-ventilated cab. Excellent all-round visibility.

Simple 2 lever controls.

Boom and dipper adjustable for reach and lift capacity to suit job.

Proven Perkins diesel engine—economical, reliable and efficiently cooled for tropical use.



Long life, large diameter, case hardened pivot pins — all fully floating.

Inherent weld stresses eliminated by heat treatment. End damped hydraulic cylinders to cushion shock loads.

Pre-loaded, cross roll bearing swing ring—smooth, positive action automatic disc brakes.

Heavy duty life-time lubricated undercarriage with automatic, fail safe brakes: hydraulic track tensioning and range of shoes to suit all ground conditions.

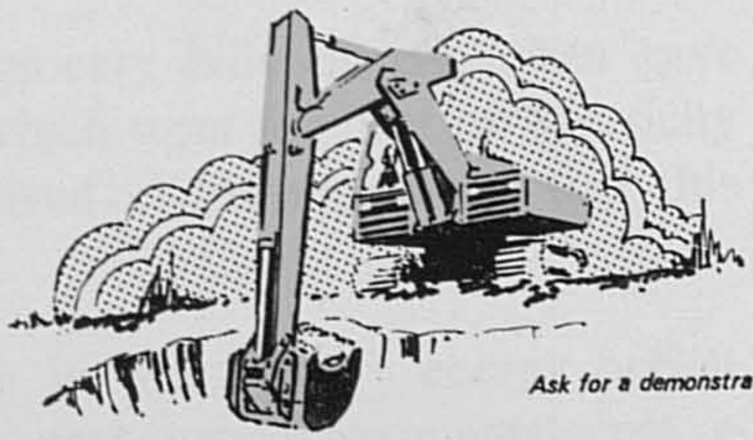
Large range of buckets up to 1½ cu. yd. capacity.

Comprehensive range of attachments.

The JCB range of tracked excavators give greater output, greater reliability, greater profit and have on-the-spot service.

JCB give you more features for so little extra.

That's JCB logic.



Ask for a demonstration today

JCB Outperforms.

WEALCO

WEARNE'S EQUIPMENT AND LAND CO.(PTE) LTD.

45, Leng Kee Road, Singapore 3. Tel: 632511
42, Road 31, Jalan Penchala, Petaling Jaya. Tel: 775349
Wearne's in Malacca, Seremban, Kuantan, Kota Kinabalu, Kuching, Tawau, Brunei.
Malayan Development Machinery in Ipoh, Butterworth, Sandakan, Miri.

the big W gives you big service

Energy: 1985 and beyond

PETER G. PETERSON

U.S. Secretary of Commerce

Several months ago, President Richard Nixon ordered a cabinet level group called the Domestic Council to review United States' energy policy. Without over stating the case, I think it safe to say this is probably the most comprehensive review of American energy policy ever made.

The group has focused on the major energy issues which must be resolved. It was instructed by the President to come up with recommendations not only for the so-called crisis period—up to 1985, but for the medium term—in the period from 1985 to the year 2000, and for the truly longer term as well.

Again, without overstating the case, I believe there is no new presidential initiative coming in 1973 that will be more important than this one.

To begin with, let me outline in general terms some of the basic causes of the so-called energy crisis. First, through our energy price structure we have been, in effect, costing out a finite inventory on a first-in, first-out basis. Secondly, and as a result of the first the normal market forces which might otherwise have brought new energy sources on stream, have not been operating. The resulting development of shortages has been gradual, but it can no longer be ignored.

Third, up to now, energy has been regarded as a perpetual motion machine. It was a happy era of low costs, low risks and high benefits. We will look back on this era with nostalgia, but wistfulness and sentimentality will not bring it back.

While such large cheap supplies were available, it was hard to see the marginal advantage of incurring higher costs necessary to raise efficiencies. The result was often gross inefficiency. Production of electric power, for instance, has been 40% efficient at best.

Home-owners who may have watched their grocery bills closely, often gave little or no thought to the portion of their budget which went for heat or electricity or even gasoline for their car. Anyone who has lived in Europe knows that this cheap-energy phenomenon is hardly universal.

The United States is now moving into an era in which every energy option will have a cost. It may be a balance-of-payments cost, an environmental cost, a competitiveness cost, a discomfort cost, or all of these. But the cost will be there, and it will be a cost higher than that to which we are accustomed. Our job now is to balance the costs and risks against the benefits—to plot the course which minimizes the former and maximizes the latter.

Lest I sound too alarmist, let me emphasize that the energy problem I speak of is essentially a problem of the near and medium-term. By medium-term, I mean

through the mid-1980's. Over the long-term our energy position is reasonably secure. To meet long-term requirements, we still have impressive potential resources of crude oil, natural gas, coal, uranium and shale oil.

Taken in aggregate, United States' basic potential energy resources have a BTU content sufficient to meet our needs for at least 200 years at present consumption rates. Long before they run out, advances in technology should bring us new energy sources, such as the breeder reactor, nuclear fusion, and solar and geothermal power. These will greatly relieve the drain upon our natural energy materials. They may be available at higher costs, but nonetheless the United States has the basic materials and technology to meet our long-term energy goals.

The energy problem as I see it at present is a systems problem if ever there was one. That is, if the system is pushed too hard from one side, it produces a bulge on the other. There will have to be a balance of cost and demand, environmental concerns and pollution levels, consumption and research and development outlays.

For instance, the energy supply which we know to be the most abundant and readily available is coal. But coal is a source of serious pollution and environmental problems. The energy source most suitable in cost and environmental impact, given existing technology, is oil and gas. But over the near-to-medium term, the available supplies of oil and gas in the United States are not unlimited even at higher prices.

Perhaps our greatest hope for the long terms lies in new sources: solar energy, fusion, fission, oil shale and geothermal energy. But none of these sources are currently economically practical, and most of them are not even technologically feasible at present.

The consumer will have to become more sophisticated too. Many will not understand not having energy available at the lowest possible price; low prices, however, we have already learned, will only ensure that the inadequacy of supplies is exacerbated. A massive public dialogue and educational effort will be required to achieve support, and understanding for a balanced program.

The United States' energy shortage also brings to the fore some foreign-policy considerations. The first, of course, is the question of national security. Domestic shortages, which force excessive reliance on foreign sources, could make the American military and defense capability vulnerable to embargo during periods of hostility. On the other hand, if you minimize imports and allow domestic prices to rise, you could well find that the high cost of energy to American industry would undermine its competitiveness and reduce our economic health to the point where that policy might also jeopardize the national security.

Or consider the balance of payments. Based on estimates of United States' energy demands, I am told that the projected United States' trade deficit in energy could be in the range of US$15 billion to US$21 billion by 1980. To put this in perspective, these imports will be about seven times the US$2.5 billion worth of energy we will be importing annually at the end of the decade.

Western Europe and Japan will find themselves in a similar position. Western Europe's projected energy trade deficit could be in the range of from US$20 billion to US$26 billion by 1980, a substantial increase from the US$8.5 billion they imported in 1970; and Japan is expected to experience an energy deficit of from US$9 billion to US$15 billion, three to five times larger than in 1970.

Thus the United States, Europe and Japan might face an aggregate energy trade deficit of from US$44 billion to US$62 billion by 1980. This could have a significant and some would say even a traumatic impact on both the international economic and political status of all parties involved.

Also, I do not believe it unduly alarmist to mention that the Soviet Union does not appear to have any energy balance problems of this nature—indeed it appears to have a remarkably large energy surplus. With this in mind, it should be evident that failure to rectify energy imbalances could have severe consequences for the entire free world.

Thus, the energy problem is not one which the United States alone faces. It is fundamentally an international problem. Given the national security implications I have already discussed, I think it is fair to say that the need for international cooperation in finding a solution—the case for international cooperation—is compelling.

(With acknowledgements to United States Information Service)

Editorial note:

Since the above was received, Dr Edward Teller*, professor-at-large in physics at the University of California, has spoken at the University of Malaya on 'The role of nuclear energy in eliminating the energy crisis'. Dr Teller said that unless an inexhaustible supply of oil and natural gas was found, there would be a world energy shortage in the near future.

"Oil prices" he said, "will reach a peak by 1980 and may decline after that because of fuel substitutes. This rising cost of energy resources will affect Malaysia and Singapore very much, since they are heavy consumers. The economics of building a nuclear reactor before you actually face spiralling costs is therefore self-evident."

---

* Sometimes called "the Father of the H-bomb"

Ecologically ideal industry

'Obviously, a return to ecological sanity would call for the abandonment of the US synthetic rubber industry and the increase of natural rubber production in Malaysia and other habitats of the rubber tree sufficient to meet world demand'. Fighting words from Professor Barry Commoner in the US *Harper's Magazine* just before the UN Environmental Conference opened in Stockholm in June.

Like many others in the highly vocal and well-organized ecology lobby in the United States of America, Professor Commoner believes that currently accepted ideas of limiting industrial pollution and the headlong consumption of irreplaceable raw materials by the industrial nations of the world are hardly relevant to what they see as the real problem.

'The relation between environment and development stands out among the issues to be considered by the Stockholm conference as the one most closely in contact with the hard realities of economics and politics. We can thank the developing nations for that'. To Professor Commoner, the major obstacle to the control of industrial pollution in the USA is its effect on profits and employment. The legal requirement that government agencies produce an Environmental Impact Statement to explain the probable effects of new projects such as the Alaska pipeline proposed by an Anglo-American oil consortium has brought them into the arena of public discussion and criticism, slowing them down. But there will always be pressure to develop them against all obstacles.

He argues that calls to nations to limit the growth of their demand for power ignore the hard fact that a good deal of this growth is due to the replacement of human labour by electric power in modern industry and since power generation is always accompanied by some impact on the environment, there is no way to cut pollution without cutting into industrial and labour productivity.

'As we learn more about the intricate connections between the environment and the economic system, it becomes increasingly evident that environmental improvement is a zero-sum game: if the environment wins, someone loses'.

Taking the rubber-producing industry of Malaysia as an example of the way in which environmental issues are deeply embedded in basic economic conflicts, Professor Commoner observes of natural rubber, 'The energy required to assemble the rubber molecule is derived from a renewable resource—the sun that rises every day—and is transferred by natural cool, non-polluting processes within the plant which, as a side benefit, also produces oxygen. Ecologically, this is an ideal way to obtain the needed good, rubber. The contrast with synthetic rubber, produced by a series of elaborate processes involving temperatures of up to 600°C and consuming a non-renewable resource, is striking'.

In his mind, there is no doubt that there should be a break from synthetics, a new reliance on natural rubber, 'The usual objection is that the total demand could

not be met in that way. But right now world production includes about three million long tons of natural rubber and five million long tons of synthetic. Thus, a rough tripling of natural production would take over the total market. And this seems quite possible. In Malaysia, half the total crop comes from large, efficient estates that produce about 800kg/hectare; the remainder is produced by small growers, at a yield of about 350kg/hectare. If those growers reached maximum efficiency, the total crop would be increased by about 50%. Moreover, new genetic rubber tree varieties that have just begun to enter production can produce as much as 3 500kg/hectare. It seems likely that natural rubber could supply world demand—if only economic and political interests did not stand in the way'.

More than merely producing the raw material, nations such as Malaysia should produce the goods made from it as well. He believes that if Malaysia and other rubber producers were given the task of meeting the world's need for rubber with no intervention from synthetic interests, 'they might well prefer to avoid a repetition of colonial independence by selling not rubber but tyres'.

In this respect the Malaysian industry is ahead of Professor Commoner, for Malaysia's Finance Minister has outlined the first steps that have been taken to initiate a large-scale manufacturing industry in Malaysia relying on natural rubber.

Much will depend on the ability of the industry to produce high-grade rubbers profitably despite low market prices and at a volume great enough to meet expanding world demand for tyres, industrial products such as conveyor belts, moulded components and domestic goods. Some pointers to this ability were released recently in Kuala Lumpur.

The industry recognizes that the lengthy period of five to six years before the trees mature is a deterrent to new investment and a significant step forward has been made with a technique of bud-grafting a selected shoot on to a 10-day-old seedling which could reduce this period to four years. Success rate is claimed to be over 70%, a high figure in agriculture, where a low percentage is usually expected.

Genetic modifications and tissue culture offer what is described as 'exciting prospects of multiplying a certain genetic individual, but more importantly also to increase the potential of creating many types of new individuals by inducing changes at the cell level'. Attempts are now being made on the much more difficult task of growing from the single cells into plants.

Since all the rubber trees in Malaysia are the descendants of the small number introduced from South America at the end of the last century, there have always been limitations due to the narrowness of the genetic base. To broaden this base, two gene-pool gardens have been established, one with 98 oriental clones and one with 49 occidental clones, and there is an agreement to exchange more clones among rubber-producing countries.

Other steps to extend genetic variability include induced mutations by X-ray or chemical means, techniques that have been shown in rice growing to have had

spectacular results. Methods of tailoring trees to meet the direct requirements of growers in different parts of the country have led to research to produce genetic dwarfs particularly suitable for budding the leafy crown.

The three-part rubber tree, in which the root stock, the trunk and the crown have each been chosen separately and grafted together to give trees with the best possible characteristics for the particular area in which they are planted, already exists.

'The environmental crisis is a signal that we have run out of ecological credit, that it is time to pay the debt to nature or go into bankruptcy', says Professor Commoner. Visitors to Malaysia sometimes comment on the 'regimented trees of the jungles' when they look at the long tree-lines of the great estates. No jungle they, but a vast and increasingly efficient factory and one that so far has no ecological debt to pay.

(With acknowledgements to *Rubber Developments* **25** (3), (1972)

MAKE A DATE

WITH

INSTANT SERVICE!

AT

Mercantile Bank Limited

A MEMBER OF THE HONGKONG BANK GROUP

BRANCHES IN WEST MALAYSIA

BENTONG
BUTTERWORTH
IPOH
KOTA BHARU
KUALA LIPIS
KUALA LUMPUR
KUALA TRENGGANU
KUANTAN
MENTAKAB
PENANG
RAUB
SEREMBAN
TAIPING
TEMERLOH

WORLD WIDE BRANCHES AND CORRESPONDENTS

Appointments vacant

We have received the following letter from the Director-General of Estates, Ministry of Agriculture, Indonesia. The additional information referred to in the fourth paragraph is available from Society headquarters.

The letter carries a postscript to the effect that *applications should be received not later than 20 February 1973.*

Gentlemen,

Executive Assistants for North Sumatra Smallholder Development Project

Under technical assistance arrangement with World Bank/IDA, the Government of Indonesia with the objective of developing some 11,000 hectares of rubber and oil palm smallholdings in North Sumatra, to be managed by a Project Management Unit (PMU) with Head Office at Aek Nabara, regency of Labuhan Batu North Sumatra, wishes to employ 3 experienced executive assistants to the Project Manager.

Candidates should have at least 8–10 years experience in their particular fields.

The positions to be filled for a period of 3 years are those of:

1. Extension and Training Officer
2. Financial Controller, and
3. Land Use and Planning Officer.

Attached to this letter we are furnishing you with the terms of reference for each of the assistants being sought, together with the background information of the project.

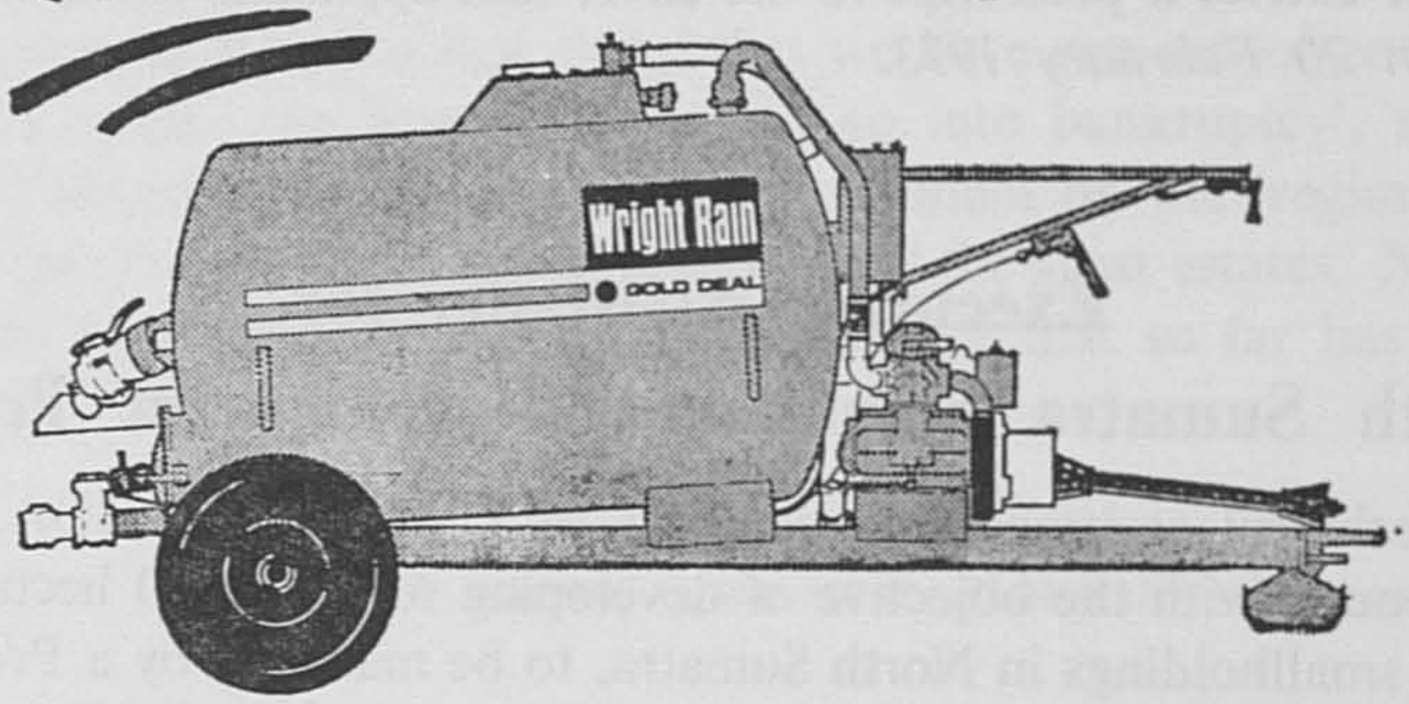
If you are in the position to recommend suitably qualified candidates or a candidate to fill either of the posts, the Government would be grateful if you could communicate with them or ask them to communicate with the Project Manager:

c/o Directorate General of Estates
Jalan Jendral S. Parman 73, Slipi,
P.O. Box 392/Jkt.
Jakarta, Indonesia.

Applications should contain details concerning experience, fitness to carry out the work and *curriculum vitae.*

Sincerely yours,
(Signed) A. MULUK LUBIS,
Director General of Estates.

NEW from Wright Rain



The GOLD DEAL slurry tanker

New ● GOLD DEAL
specification to beat your muck problem

J. WHYTE

J. WHYTE & CO. (MALAYA) SDN. BHD.
9, JALAN 222, P.O. BOX 79, PETALING JAYA, SELANGOR, MALAYSIA.
TEL. NOS. 772533, 772624, 772852 & 63127. TELEGRAMS 'SEMAJ' PETALING JAYA

Branch Offices:

IPOH
126B Post Office Road,
P. O. Box 236.
Phone 5170 Tel. Ad. "SEMAJ"

SINGAPORE
3rd Lokyang Rd., Jurong.
Phone 653677 Tel. Ad."SEMAJ"

KOTA KINABALU
P. O. Box 1096 Kota Kinabalu

SANDAKAN
1¼ Mile Leila Rd., (Sabah
Timber Co. Yard) P. O. Box 1371

LONDON
1-4 Great Tower, London EC3.

Subsidiary Co:
Power Drilling Sdn. Bhd.
9, Jalan 222, P.J. P. O. Box, 79 PJ

DO A GOLD DEAL WITH US!

AMCHEM ™

ETHREL™

LATEX STIMULANT

ACTIVE INGREDIENT:
ethephon [(2-chloroethyl) phosphonic acid] 10.0%
INERT INGREDIENTS: 90.0%

USAGE

The contents of this package should be sufficient to treat approximately 200 trees of average girth tapped on ½ spiral cuts. Apply at 2 monthly intervals with a flat paint brush to a band of lightly scraped bark below the tapping cut, the width of which should be equal to the bark consumed during two months of tapping.

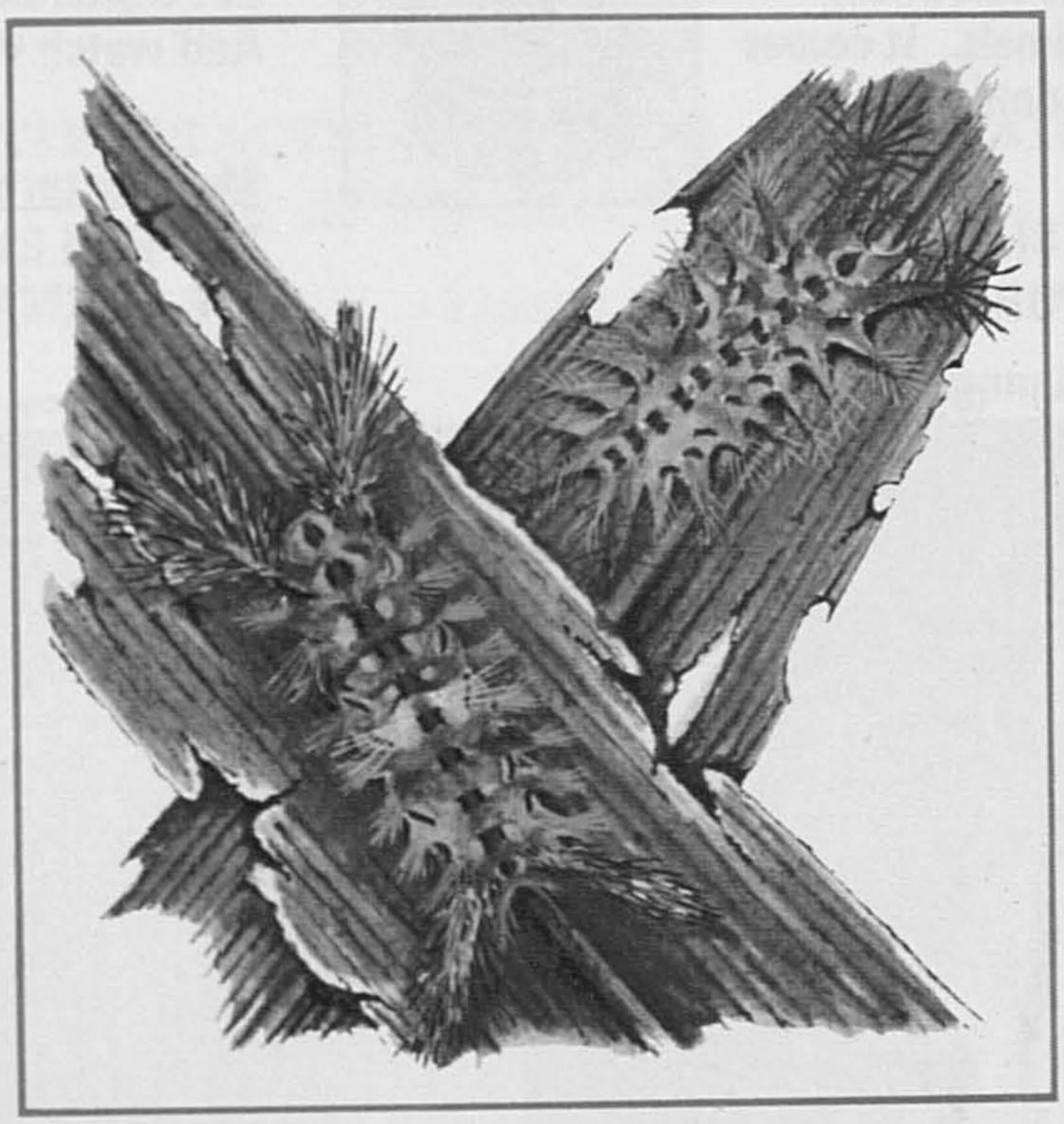
This will vary according to the standard of tapping and the interval between tappings, i.e. - alternate daily, third daily etc.

Chemistry's answer to today's rubber price

AMCHEM T.M.

Sole Agents:
HARRISONS & CROSFIELD (M) SDN. BHD.

When unwanted guests like these drop in for lunch on your plants....

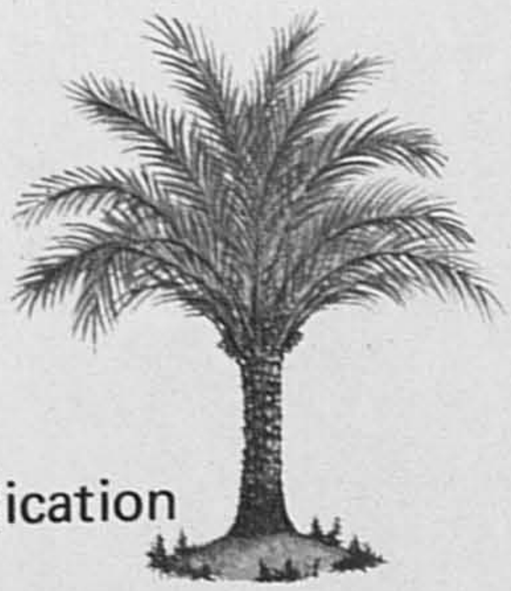


....serve them MATACIL®

When your plants are being destroyed by hard-to-kill nettle caterpillars, MATACIL is the most effective way to control them.

In addition, MATACIL spares beneficial insects.

MATACIL is economical to use at an application rate of ¼ lb. per acre.



BAYER (MALAYSIA) SDN. BHD. BAYER (SINGAPORE) PTE. LTD.

KUALA LUMPUR · PENANG · SINGAPORE

®DIPTEREX SP95 WILL FIX THEM!

Your oil-palm will take to Dipterex SP 95. Bagworms, nettle and slug caterpillars will not. Its effectiveness as a stomach poison will rid your oil-palm estate of these pests, quickly, efficiently, while ignoring harmless insects. Dipterex SP 95 is odourless, and is safe to humans and animals. It comes in a soluble powder and you don't have to



worry about clogged nozzles for Dipterex SP 95 dissolves completely. Its ULV formulation means effective small volume application over large areas. Which means time and money saved during spraying. Let Dipterex SP 95 fix them. And watch your profits grow.

Sole Importer:
BAYER (MALAYSIA) SDN. BHD.
BAYER (SINGAPORE) PTE. LTD.
Singapore. Kuala Lumpur. Penang.

Manufacturer:
BAYER LEVERKÚSEN
(W. GERMANY)

® Registered trade mark of Bayer, Germany.





Social and Personal

Awards of Associate Diploma

Tey Boon Ching	—	(Central Perak)
Seng Kim Huat	—	(Malacca/Muar)

ESTATE PRACTICE (RUBBER) EXAMINATION
22 September 1972

PASSES

Seng Kim Huat	—	(Central Johore)
Chew Fook Seong	—	(Kedah/Penang)

ESTATE PRACTICE (OIL PALM) EXAMINATION
22 September 1972

PASSES

Lim Men Jang	—	(West Pahang)
Mohd Zain bin Haji Idris	—	(South Johore)
L Subramaniam	—	(Lower Perak)
Mohd Damanhuri bin Haji Mohd Ibrahim	—	(Lower Perak)
Chin Kian Ming	—	(Central Perak)
Tey Boon Ching	—	(Central Perak)
M R Jayesuria	—	(S. Trengganu/E. Pahang)
Yang See Chuan	—	(Kedah/Penang)
Chen Hen Yen	—	(Kedah/Penang)
Chong Tong Soo	—	(Central Johore)
Lim Tam Jan	—	(Selangor)
Titus Ng Man Yin	—	(Sabah–Tawau)
Andrew Ding Hong Sing	—	(Sabah–North East)
Chok Choo Yong	—	(Sabah–North East)

Birth

OLBERY: To Ivy and Clive Olbery a son Charles, on 27 December 1972, at Kuala Pilah.

Marriage

GOLDTHORPE — CHANG: Christopher Campbell Goldthorpe to Rosa Chang Wei Ling at Barnsley Yorkshire, on 16 October 1972.

Death

BATCHA: A K Batcha, factory assistant, Sungei Wangi Estate, formerly of Kubang Estate, Nilai.

On leave

4616 Boardman, D J, AISP, c/o National Westminster Bank Ltd, 1 Mincing Lane, London E C 3, England.

5015 Clifton-Brown, N, BSc (Agri), AISP, 24 Westbourne Terrace, Hyde Park, London W 2, England.

4160 Lumsden-Bedingfeld, R W, Church Farm, Necton, Nr Swaffham, Norfolk, England.

4663 MacKenzie, R, AISP, "East Mayfield", Gannochy Road, Perth, England.

Returned from leave

5008 Baskett, J P C, AISP, West Estate, Carey Island, Port Klang, Selangor.

4059 Hilston, W B, Chersonese Estate, Kuala Kurau, Perak.

5780 Mayakrishnan, P, Botany Division, Rubber Research Institute of Malaya, P O Box 150, Kuala Lumpur.

5304 Stewart, M D, Senawang Estate, Sungei Gadut, Negri Sembilan.

4525 Wallace, K T, Tangkah Estate, P O Box 503, Tangkak, Johore.

4258 Zelvelder, C A, Moynalpy Estate, Gopeng, Perak.

Change of address

5670 Abdul Rahim bin Syed Mohamed (Syed), Brooklands Estate, Banting, Selangor.

5588 Allaries, M E, c/o PNP–X, P O Box 74 Kedaton, Tanjong Karang, Indonesia.

5028 Ballard, J S, NDA, MRAC, c/o Kamsco Pty Ltd, P O Box 46, Kavieng, Papua New Guinea.

4230 Carruthers, H, Sungei Gapi Estate Group, Serendah P O, Selangor.

5187 Chieng Ngie Leong, AISP, Sungei Rinching Estate, Semenyih, Selangor.

5365 Farquharson, A J C, SDA, Rubber Adviser, Tree Crops Division, Department of Agriculture, Monrovia, Liberia.

5833 Fuchter, J H, Uniroyal Chemical, 5 Lynwood Grove, Singapore 13.

4518 Gillbanks, R A, c/o Harrisons Fleming Advisory Services, P O Box 1007, Kuala Lumpur.

4085 Khoo Peck Leong, 8 Adam Road, Singapore 11.

4750 Lee Lye Huat, Robert, Sungala Estate, Port Dickson, Negri Sembilan.

5422 Lim Hong Joon, Kuala Kangsar Estate, Gapis Division, Padang Rengas, Perak.

5243 Loh Ah Mee, Kempas Klebang Estate, Bekok Division, Bekok, Johor Baru.

5475 Lim Men Jang, AISP, Asia Oil Palm Sdn Bhd, Sri Jaya New Village Pahang, Maran, Pahang.

5698 Liew Nyuk Phin, Department of Agriculture, Kota Kinabalu, Sabah.

5158 Mohammed bin Haji Hashim, AISP, Sungei Chinoh Estate, Trolak, Perak.

4737 Mohd Khalid bin Tunku Ahmad (Tunku), REM Estate, Kota Tinggi, Johore.

4698 Matupang, L P, c/o 83 Jalan Sungai Kelian, Tanjong Bungah, Penang.

4343 Nair, T V K, 343 Sikamat Garden, Seremban, Negri Sembilan.

5478 Renganathan, L, 34-D Jalan Scudai, Tampoi, Johor Baru.

3407 Rance, R R, Riwaka Valley Road, Nelson, South Island, New Zealand.

4443 Salter, Ahmad Jais, Ranchangan Sungei Manila, P O Box 1253, Sandakan, Sabah.

5792 Selvarajoo, P, Torkington Estate, Sabak Bernam, Selangor.

5830 Sumathri, G V, Harvard Estate, Bedong, Kedah.

5333 Tan, Vincent, Port Dickson Lukut Estate, Port Dickson, Negri Sembilan.

4939 Woodworth, P E, Pajam Estate, Mantin, Negri Sembilan.

5488 William, R D, Gomali Estate, Gemas, Negri Sembilan.

5241 Wong Tee Kiang, Dip Agri, AISP, RRIM Station, Kota Tinggi, Johore.

4751 Chiew Ah Wah, Ladang Juntai Sdn Bhd, Triang P O, Pahang.

4847 Namasivayam, S, Arcadia Estate, Bagan Datoh, Lower Perak.

5470 Purba, A J L (Ir), Production Manager, PNP VII Bah-Jambi, c/o Liaison Office PNP VII, Jalan Kartini 8-C, Medan, Sumatra.

5612 Seng Kim Huat, AISP, Kempas Devon Estate, Merlimau, Malacca.

ANNUAL GENERAL MEETING
and LUNCHEON

Saturday, 14 April 1973

at

COMMONWEALTH HOUSE
Damansara Heights, Kuala Lumpur

(Members will be advised of further details in due course)

Officers

Chairman

Chua Hood Chuan PJK JP AISP
Trengganu Development & Management Bhd
P O Box 10
Kemaman Trengganu

Vice-Chairman

Tan See Yeok AISP
RRIM Experiment Station
Sungei Buloh Selangor

Executive Secretary

D A Earp
P O Box 262
Kuala Lumpur Selangor

Executive Committee

Chua Hood Chan PJK JP AISP (*Chairman*)
Tan See Yeok AISP (*Vice-chairman*)
D A Earp (*Secretary*)
Johari b Abbas AISP
A S Taylor JP FISP
V E Knight
P H Dale-Rudwick
W Newall
C J Sergeant NDA AISP

Technical Education Scheme Committee

C J Sergeant NDA AISP (*Chairman*)
D A Earp (*Secretary*)
Khoo Khee Ming B Agric Sc
J B McIntosh
Tan See Yeok AISP
R L Wastie MA PH D

Finance Committee

Chua Hood Chan PJK JP AISP (*Chairman*)
Tan See Yeok AISP (*Vice-chairman*)
D A Earp (*Secretary*)
Johari b Abbas AISP
G C McCulloch FISP
A S Taylor JP FISP

Executive Councillors

V E Knight *Kedah/Penang*
J G MacQuistan *Perak Central*
B K Cawkwell *Perak Lower*
Johari b Abbas AISP *Selangor*
C W Hart *Pahang West* (Ag)
Vincent Tan *Negri Sembilan*
P W Hanson *Malacca/Muar*
B Allen-Edmett *Johore North* (Ag)
Mahbob b Abdullah AISP *Johore Central*
P H Dale-Rudwick *Johore South*
Lee Kim Tin *Kelantan/Trengganu*
W S Baillie *Trengganu South/Pahang East*
Chua Cheng Ean AISP *Sabah: Tawau*
A J Wong *Sabah: Northeast*
Lai Thian Sang *Sarawak*
G C McCulloch FISP (co-opted)
W Newall (co-opted)
C J Sergeant NDA AISP (co-opted)
A S Taylor JP FISP (co-opted)

Ansar 529 is specially manufactured in Malaysia



for total eradication of weeds



a Product of
ANSUL (MALAYSIA) SDN BERHAD

Sole Distributors:-
HARRISONS & CROSFIELD (M) SDN. BERHAD

Pudina Mutton

Ingredients

1 lb boneless mutton
2 fresh limes
6 small onions
1 stick cinnamon — 2 in. long
2 tablespoons cooking oil
½ teaspoon turmeric powder
Salt to taste

Method

To be ground separately (an electric blender may be used)

2 in. piece ginger — peeled
5 green chillies or to taste
2 oz cashew nuts
1 handful mint leaves (fresh) — stalks removed
1 level tablespoon black peppercorns

Cut mutton into thin 1 in. long pieces.

Rub in ginger, salt and turmeric powder and leave aside to marinade for 4 hrs.

Cut onions into slices.

In a thick bottom saucepan or a pressure cooker, heat the oil and fry the onions, until they appear glassy.

Add mutton, stir well for about 2 minutes.

Add 1 cup of water and stir.

If a saucepan is used, bring to the boil and cook over low fire till meat is tender.

If a pressure cooker is used, cover with its lid, lock and cook for 10 minutes from the time steam starts to escape. Turn off heat, and remove the cover when the pressure gone completely. Proceed as follows on low flame.

Add remaining ingredients except for the lime.

Stir well and continue cooking till gravy thickens. Add more water if necessary.

When meat is tender, take off fire, squeeze lime juice over it and stir lightly.

Garnish with fried rings of onions and thin slices of fresh red chillies or red paprika.

Serve hot with rice.

ADVERTISEMENT INDEX

	PAGE
Bayer (Malaysia) Sdn. Bhd.—	
Dipterex SP/95	Facing XI
Behn, Meyer & Co. (M) Sdn. Bhd.—	
Calixin	VII
B.O.A.C.—	
London via Colombo	III
Diethelm & Co., Ltd.—	
Aluminium tanks	I
Dow Chemical International—	
Dowpon-S	Facing 19
Fusan Fishing Net Mfg. Bhd.—	
"The Net-Collection-System"	Facing 46
Guthrie Waugh (M) Sdn. Bhd.—	
Karmex	Facing 52
Harrisons & Crosfield (M) Sdn. Bhd.—	
Ethrel	Facing XI
Ansar 529	Facing 63
Harrisons Lister Engineering Ltd.—	
Diesel engines	VIII
Hickson's Timber Preservation—	
Gangnail	X

	PAGE
I.C.I. Agriculture (M) Sdn. Bhd.—	
Ganocide	Facing 40
Fertilizer	Facing 19
Gramoxone	Facing 40
'Lissapol' 990	Facing 46
J. Whyte & Co. (M) Sdn. Bhd.—	
Slurry Tanker	XI
Mercantile Bank Ltd.—	
Instant Service	58
Progress Motors Pte. Ltd.—	
Holden	II
Quantas—	
Australia: Fly Quantas 747B	VI
Shell Malaysia Bhd.	Cover Pages
Si-Rusa Inn—	
"Sea Breeze" Chalets	Facing 34
Swissair—	
"Snow Beach"	V
Union Carbide (M) Sdn. Bhd.—	
Temik 10G	IV
WEALCO—	
Chamberlain	Facing 34
J C B	Facing 52
Wix Corporation (S.E.A.) Sdn. Bhd.—	
Wix filters	IX

Published by the Executive Secretary, Incorporated Society of Planters, Kuala Lumpur and
Printed by Yau Seng Press, No. 26, Jalan Silang, Kuala Lumpur.

If it's a chemical
or you think it's a chemical
call Shell Chemicals

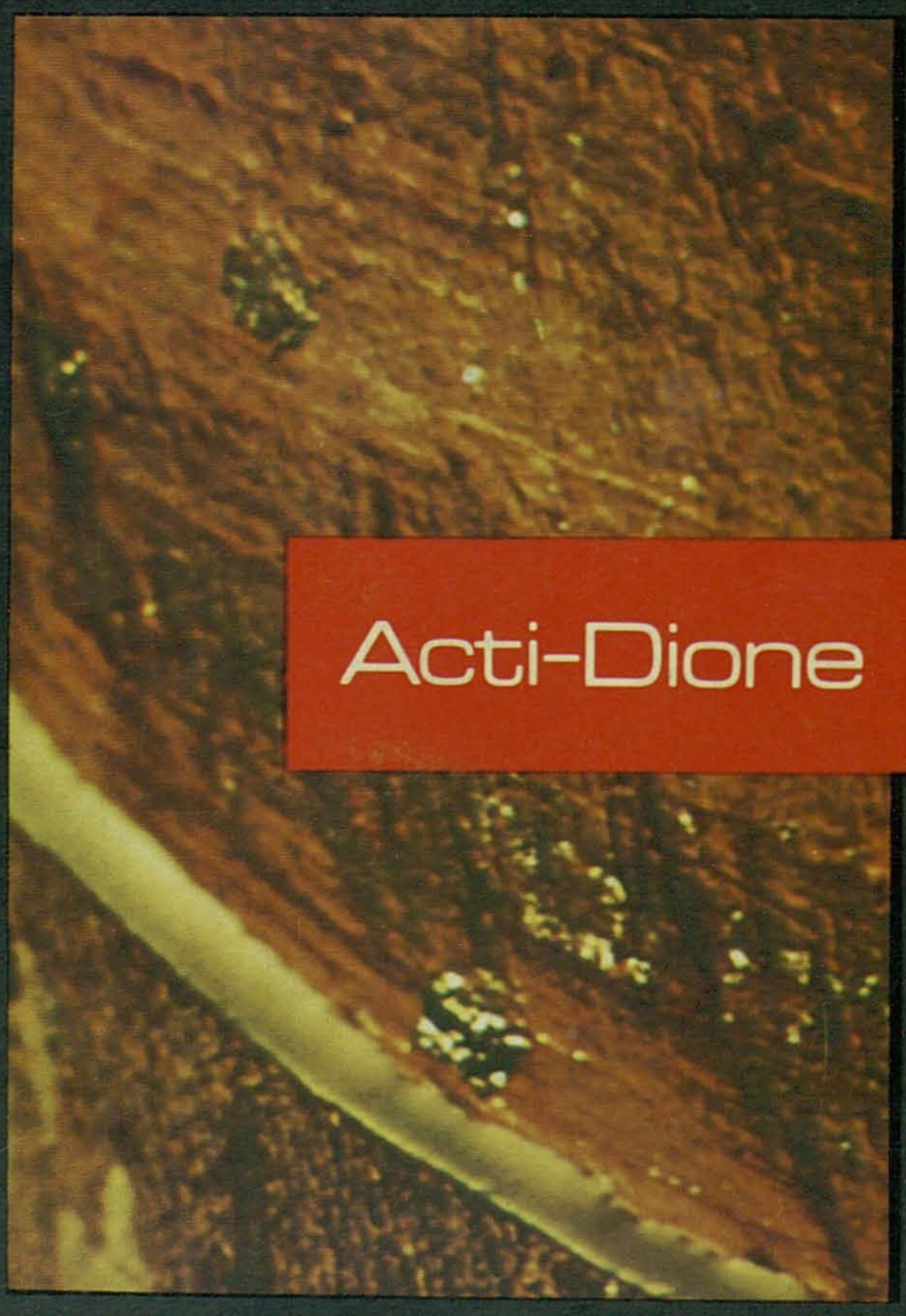
Some fungi cause disease. Blackstripe and Mouldy Rot in rubber trees. Stem Canker in cocoa. If let alone they spread. Fast.

Control these fungi and you control the disease. Acti-Dione does it. It is an anti-biotic fungicide. It's a localised systemic fungicide, acting on the infected plant tissues. The fungi cells are selectively destroyed by Acti-Dione. Fast.

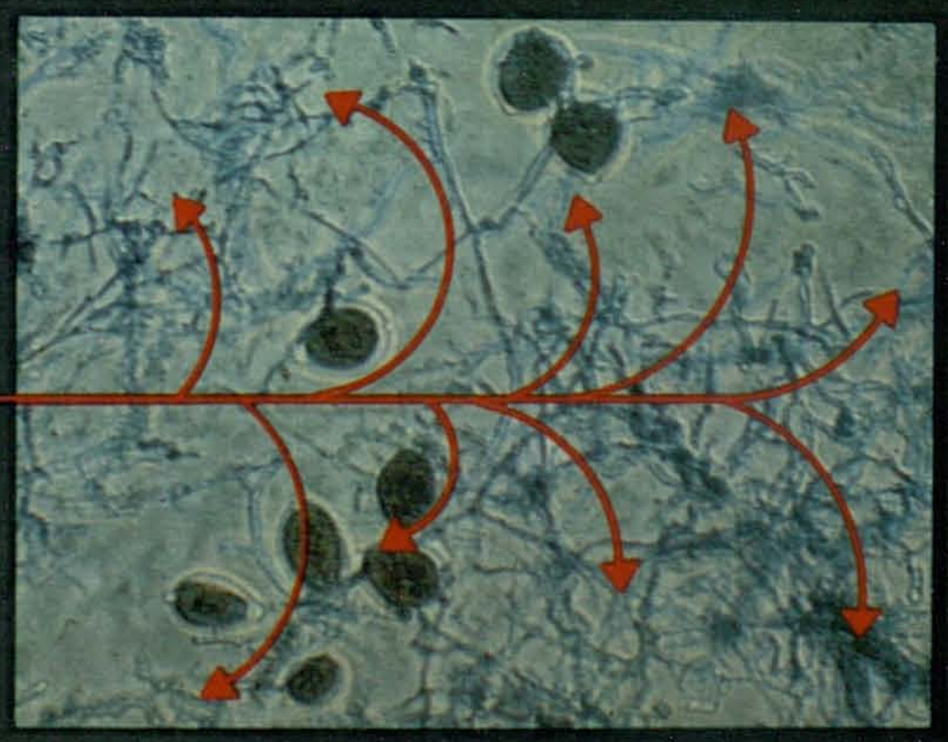
But get more details from your nearest Shell office. And remember: if you need a chemical — or you think there may be a chemical that might help you — call Shell Chemicals.

Acti-Dione attacks fungi from the inside.

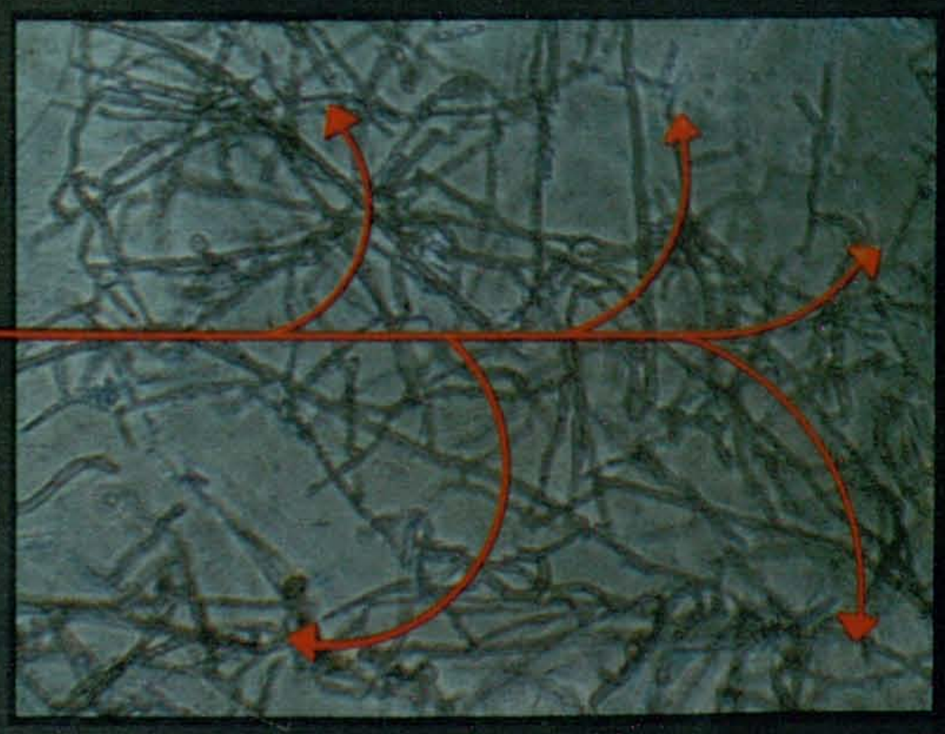
108-MS-AG(E)



Acti-Dione



BLACKSTRIPE FUNGI—PHYTOPHTHORA PALMIVORA



MOULDY ROT FUNGI — CERATOCYSTIS FIMBRIATA

TUCO

A DIVISION OF THE UPJOHN COMPANY, KALAMAZOO, MICH, U.S.A.

Shell Chemicals