AA RESEARCH NEWS

January, 91

EDITORIAL

The enormous success of synthetic insecticides such as DDT and BHC following the conclusion of World War II began a new era of pest control. These two products were followed by hundreds of effective synthetic pesticides: acaricides, fungicides, herbicides, insecticides, nematicides and rodenticides. The number of registered pesticides rose from about 30 in the 1930's to more than 900 in the 1970's.

Agricultural chemicals have become an increasingly important part of crop production. Besides pesticides to protect the crops, chemical fertilisers have been produced to supply nutrients to the growing crop. Use of chemicals have allowed increased crop production in nearly all parts of the world where their application has been feasible.

Another vital role for chemical products is in the control of disease vectors such as those for malaria, yellow fever and chagas' disease. In this function they protect millions of human lives, particularly in tropical and subtropical regions, and hence make a significant contribution to national economies and maintenance of public health.

The reliance on and continuous use of such chemicals however has led to concerns over new or resistant pest populations and loss of pesticide efficacy in many parts of the world. The potential ubiquitous presence of pesticide residues in food, feeds and organisms occupying every part of the ecosystem has caused widespread concern among scientists and informed citizens alike about contamination.

Awareness of these however has led to voluntary and legislative controls in the chemical industry and led many agriculturists and scientists to developing new or alternative crop production methods which reduce (not remove) reliance of farmers on agricultural chemicals. Agricultural cropping systems whcih promote efficient and sustainable production while minimising external inputs and degradation of soil and water resources have been promoted as alternatives to conventional production practices.

Contrary to the thinking of some people, the use of pesticides for pest control is not an ecological sin. When their use is combined with sound ecological principles and practices chemical pesticides provide a dependable and valuable tool.

It has been estimated that without pesticides, about 15 percent of the world's total crop may be lost during cultivation as the result of pest attack and a further 20 percent lost during post - harvest storage. The estimated loss in tropical countries would be even greater. The combined effect of pest attacks and plant diseases may result in a loss of 35 to 50 percent from the potentail yield of crop while pest attacks may cause a further 20 percent loss during post-harvest storage.

In Malaysia, all commercial crop protection products are subject to strict legislation. Before a product is released for sale, safe residue levels have to be established. An insight into the pesticides R & D and pesticide regulations is provided in this issue of AAR News. In general,residue problem is exaggerated in public,due in part to the highly developed trace analysis techniques, which can detect residue levels expressed in ppb (parts per billion), actually present.

Chemical compounds such as pesticides are not luxury articles of a technologically advanced civilisation but necessities for the survival of world population.

Pesticides are still an indispensible tool in crop protection. It should always be remembered that the application of pesticides can lead to environmental contamination and it can only be justified when benefit/risk ratios are clearly tilted in favour of pesticide use.

Samsudin, A

Guest Article - AN INSIGHT INTO THE R&D OF PESTICIDES

Background

On a world-wide basis the total pesticide usage for 1988 was around US$20 billion. In comparison, the figure for Malaysia was estimated at US$100 million or 0.5 percent of the world total. Pesticides belong to the group of fine chemicals which includes pharmaceuticals, animal health products, etc, where extensive research is mandatory before they can be marketed. Unlike the pharmaceutical or

HIGHLIGHTS

- **Guest Article - R & D of Pesticides**
- **Pesticide Safety & Handling**
- **Pesticides Regulation**
- **Sulphur Dusting on Oidium in Rubber**

animal health products, local researches are extremely important as the target organism, cultural practices and habitats are significantly different from country to country.

Table I shows the R&D expenditure estimates of the top 20 companies for 1986. Although it is quite outdated, in view of the key mergers and acquisitions that had taken place during the last two years, the allocations for the R&D expenses remain relatively unchanged. The pesticide industry expends almost 12% of its own product sales value into R&D, that is, approximately US$2.3 billion for 1988. This figure is growing as more stringent requirements are being legislated on a global basis. Besides the long and tedious toxicological studies, local bioefficacies, emphasis is now placed on residue studies for both the food crops and the environment. Despite the adverse publicity given by pressure groups, the pesticide industry has embarked in the research to discover products which pose minimal toxicity problems, have specific mode of action at low rates and are readily degradable. The need to discover pesticides to meet the above requirements has resulted in a mine of new chemistry which hitherto had been unheard of.

Table II shows the major trends of changing product sales. For the herbicides only the substituted ureas, diazines, diphenyl ethers and newer products such as glyphosate, Basta, etc. will show increased growth to the end of this decade. The older groups of chemistry will show gradual decline. Among the insecticides, only the pyrethroids and IGR's are expected to show growth. Again the older products will be gradually phased out. The fungicides are extremely diverse, but there is good future for the systemic products. From the market value, it would appear that the growth for the herbicides would slow down during the last five years of this decade when compared with those of the insecticides and fungicides. This is in fact quite the contrary, as herbicide usage has grown at a faster rate than the insecticides or fungicides. The reasons for the "apparent" lower growth rates are : replacement with newer, more efficient products eg Ally and the patent expiry of key products eg glyphosate.

Table 1: R & D Expenditure Estimates 1986 (US $)

Company	Agrochemical Sales – $M	Agrochemicals R&D – $M	R&D % age of Sales	R&D as % of "Own Sales"
Bayer	2380	195	8.2	(1969) 11.5
Ciba-Geigy	1780	148	8.3	(1292) 11.3
Rhone-Poulenc	1105	86	7.8	(843) 10.2
Monsanto	1067	94	8.8	(1022) 9.2
ICI	1040	86	8.3	(819) 10.5
Shell	1005	76	7.6	(639) 11.9
BASF	925	84	9.1	(750) 11.2
Hoeschst	890	98	11.0	(690) 14.2
Du Pont	780	84	10.8	(661) 12.7
Dow	770	68	8.8	(680) 10.0
Schering	640	62	9.7	(390) 15.9
Am. Cyanamid	458	45	9.8	(417) 10.8
Sandoz	422	40	9.5	(265) 15.1
Stauffer	405	40	9.9	(310) 10.8
Eli Lilly	389	45	11.6	(354) 12.7
Kumiani	350	22	6.3	(250) 8.8
Rohm & Haas	347	34	9.8	(309) 11.0
FMC	340	48	14.1	(300) 16.0
Un. Carbide	300	32	10.7	(250) 12.8
Sankyo	290	16	5.5	(134) 13.4
Total	15683	1405	9.0	(12131) 11.6

Table II: Product Trends 1972 to 1986 to 90 (US $)

Product Group	1972 Market value	1986 Market value	1986 % p.a growth	1990 Market value	1990 % p.a growth
Triazines eg Atrazine/Ametryne	930	1430	3.1	1230	- 1.4
Amides eg Lasso/Stam	370	975	7.2	920	- 1.4
Carbamates eg Molinate	445	800	4.3	740	- 1.9
Ureas eg Diuron/Ally	580	810	2.4	980	4.9
Toluidines eg Treflan	320	640	5.1	575	- 2.6
Hormones eg 2, 4-D/MCPA	460	460	–	340	- 7.3
Diazines eg Ronstar	50	475	17.4	555	4.0
Diphenyl Ethers eg Goal/X-52	40	390	17.7	485	5.6
Others eg Paraquat/Glyphosate/Basta	265	1620	13.8	2175	7.6
HERBICIDES	**3460**	**7600**	**5.8**	**8000**	**1.3**
Organophosphates eg Monocrotophos	1165	1875	3.5	1850	- 0.3
Pyrethroids eg Cypermethrin	–	1375	N.A	2150	11.8
Carbamates eg Carbofuran	750	1140	3.0	950	- 4.5
Organochlorines eg Heptachlor	1370	500	- 6.8	350	- 8.5
Others eg IGR, acaricides	145	560	10.1	800	9.3
INSECTICIDES	**3400**	**5450**	**3.4**	**6100**	**2.9**
Benzimidazoles eg Benomyl	105	460	11.1	545	4.1
Triazoles eg Baycor	–	295	N.A	375	6.2
Other Systemic eg Alliette/Ridomil	155	815	12.6	122.5	10.7
Dithocarbamates eg Mancozeb	700	640	- 0.6	600	- 1.6
Inorganic eg Cu, S	515	475	- 0.6	450	- 1.3
Phthalimides eg Captan	305	275	- 0.7	275	–
Other Non-Systemic eg Daconil	320	290	- 0.7	290	–
FUNGICIDES	**2100**	**3250**	**3.2**	**3760**	**3.6**
PGR' s	310	655	5.5	820	5.1
NEMATICIDES/FUMIGANTS	**330**	**445**	**2.2**	**520**	**4.0**
TOTAL	9600	17400	4.3	19200	2.5

Pesticides Research & Development

From Table II, it is quite apparent that the survival of the major pesticide giants must greatly depend on their ability to generate new products to meet the changing needs and legislation. The key to their survival must surely rest on the team of extremely specialised researchers: chemists, toxicologists, chemical engineers, biologists, patent lawyers and field agronomists. A typical top 20 pesticide company would employ some 100 specialists for the central research station alone. Annually they would screen between 4,000 to 8,000 new compounds which could be synthesized from their own laboratory or francised from independent chemists world-wide. Today, the discovery of new areas of activity does not rest solely on chance event alone.. Chemists are now able to identify areas of activity within a compound and be able to link this activity to the other requirements : toxicology, biodegradability, persistence in the crop and environment and breakdown products. At the same time, the activity of the product must be maintained or enhanced while the cost of synthesis/ manufacture be minimised.

Figure I shows the route which a promising compound has to undergo before final commercialization. Once a promising activity has been discovered, application for patent is lodged and preliminary activity will be carried out in the greenhouse. Upon the confirmation of the activity, preliminary toxicology and field trials would be carried out. Further trials are carried out in specific stations world-wide for its specialised usage. In Malaysia there are at least five research stations belonging to multi-national companies with the purpose of carrying out such screenings. Compounds at this stage are coded as there are diverse numbers of similar activity. Upon the completion of the preliminary studies, a decision will be made if there is a basis for further studies. Factors to consider are toxicology, bioefficacy, residue problem, cost of synthesis and market potential.

Once the commitment to embark on the commercialization is made, the arduous process of evaluation on toxicology, bioefficacy, environment residues, synthesis and formulation begins.

The major studies are :-

Toxicology

These studies include:

- Acute Toxicity for establishing LD50 for a wide range of mammals, avians, etc.
- Acture Dermal Toxicity for mammals
- LC50 for aquatic life,
- Inhalation Toxicity,
- Subchronic Toxicity - 90 days evaluation,
- Chronic Toxicity 1 to 3 years or 3 generations,

to evaluate mutagenic, teratogenic, oncogenic and reproductive effects.

Additionally the metabolic effects and changes of key enzymatic activities are monitored. Long term feeding studies are required to establish no-effect levels (NOEL) and acceptable daily intakes (ADI).

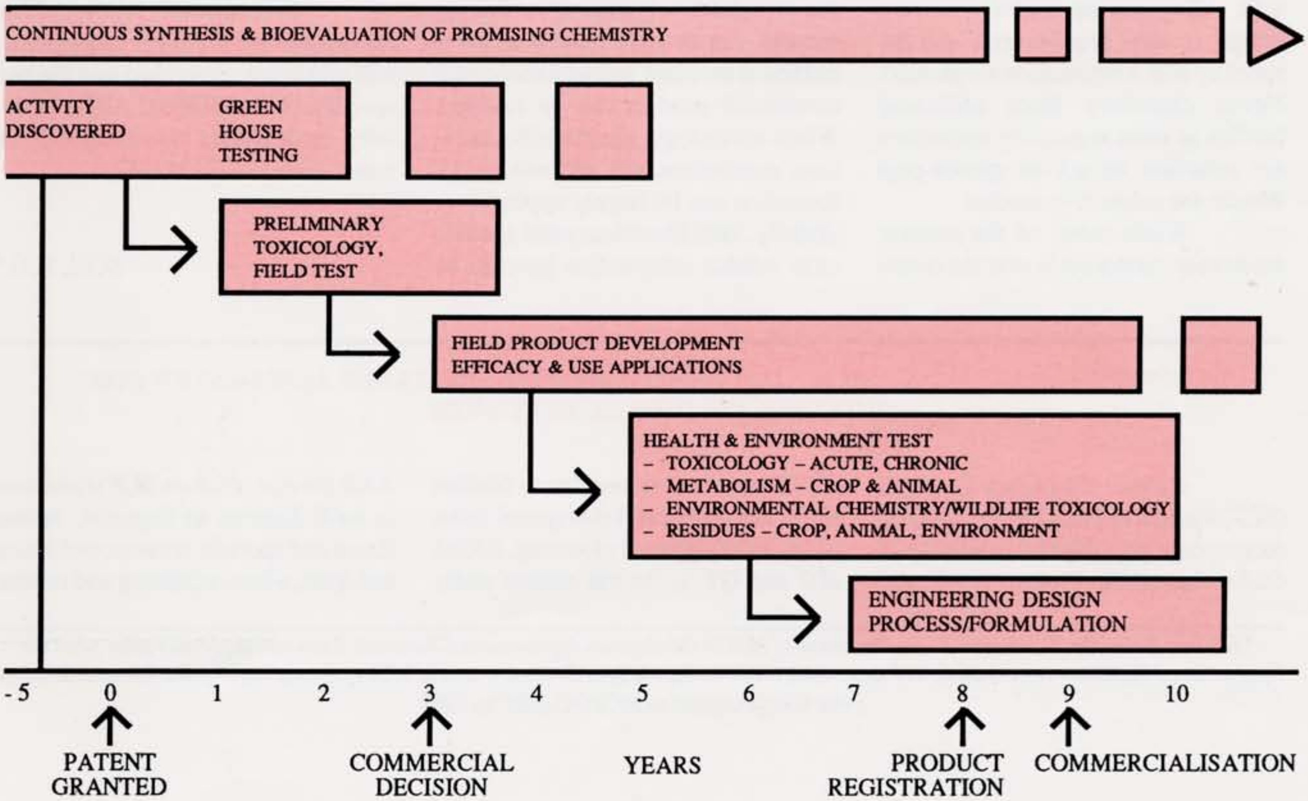
Bioefficacy Trials

These are used to establish rates, frequency of application, length of control, etc. for various weeds, pest and diseases. Phytotoxicity evaluation is mandatory and can be tedious for perennial crops. There are increasing queries on effects upon non-target organisms and natural predators of pest in question.

Wildlife Toxicology

Mammals and avians are of primary concern now, but the tendency is to include more phyla of the animal kingdom.

FIG 1. : R & D Activity for Pesticides



Environmental Chemsitry

Leaching studies, persistence in soils and underground water, breakdown products and their potential hazards are now mandatory requirements for most regulatory bodies.

Crop and Animal Residues

Extensive crop residue data for food crops and fodder are now expected. Malaysia, for instance, adopted the Codex Alimentarius which forms the basis of the maximum residue levels (MRL's) in the Food Regulation Act 1986. For the major crops such as oil palm and cocoa, many companies may find the investment in residue studies worthwhile. However, for the minor crops, studies are likely to be neglected. Animal residue studies are not neglected even if animal husbandry or the dairy industry are not of major significance.

The above list is by no means exhaustive. Depending on the efficiency of the company involved, and whether unforseen problems are encountered, this process will take between 3 to 8 years. During this period the data generated will satisfy some of the most stringent regulatory bodies. The ultimate result is the generation of a registration package. More than two-thirds of the countries world-wide have registration authorities. They represent more than 90% of the pesticides sold. Registration authorities vary greatly in their requirements and the speed by which registration are granted. Newer chemistry faces additional hurdles as most regulatory authorities are reluctant to act as guinea-pigs despite the exhaustive studies.

While most of the esoteric studies are quite alien to us as the centre of the basic studies are centered in either Europe, USA and lately Japan, we are quite exposed to the bioefficacy aspects of the research.

Local Bioefficacy Trials

Malaysia prides itself in being at the forefront of tropical perennial crops (rubber, oil-palm, cocoa) researches. Pesticide companies are quick to make use of the quality researches being carried locally by the highly trained and disciplined workers. To-date there are five research stations being set up : ICI (Malacca), Ciba-Geigy (NS), Bayer (Klang), ACM (Kedah) and Hoechst (Selangor). In addition, companies without research stations are dependent on quasi-government research stations (MARDI, RRIM, PORIM, etc.) and the many private research stations of the large independent plantation agencies : KGSB (Chemara), AAR, OPRS, PBRS, UP and a host of others. Nearly all the major pesticide companies have a good complement of technical personnel conversant in the product range. At our last survey, the ratio of tehcnical personnel to sales/marketing is 1:2 which attests the emphasis on proper product usage and safe application techniques.

Harmonisation of Bioefficacy Studies

The cost of pesticide R&D today is prohibitively expensive. It is estimated that at least US$80 to $100 million is invested before a successful commecial product can be realised. While toxicology, synthesis/formulation, metabolism and soil residue information can be largely applied universally, local bioefficacy and specific crop residue information have to be separately generated. In order to minimise cost and as well to expand trials over a wider range of weeds, pests and disease, efforts are underway to harmonise test protocols for bioefficacy on a regional basis. Last year, a regional workshop jointly organised by FAO, Dept. of Agriculture, Malaysia and GTC, was held at Kuala Lumpur to work out the basics of harmonisation. This is a significant step towards a universal harmonisation of pesticide registration.

CONCLUSION

The research and development of pesticides is a long, arduous, sophisticated, expensive and chancey exercise. There is every indication that the number of companies involved will be significantly reduced through mergers or buy-outs. The centres of creative chemistry and development of novel chemistry will still remain in Europe, USA and Japan. Centrally planned economic and developing nations would increasingly manufacture greater volume of generic products but are unlikely to participate actively in R&D efforts within this century. There are a lot of opportunities for Malaysia to develop into a centre for bioefficacy evaluation in the tropics. Additionally, the backlog of residue work, which may run into years, can be relocated here as we have the infrastructure to meet the requirements.

In conclusion, it is hoped that the insight into the R&D of pesticides will add a new dimension into the perspective of the MOPGC ARC. Hopefully, both parties can co-operate towards their mutual benefit.

SOH, K.G.*

COMMERCIAL EXERCISE ON SULPHUR DUSTING WITH PORTABLE ACM DUSTER FOR CONTROL ON OIDIUM IN RUBBER

Oidium Secondary Leaf Fall (SLF) has become more problematic in recent years, possibly due to build up of *Oidium* inoculum. Clones PB 5/51 and PB 235 are most susceptible to *Oidium* SLF. The disease has also spread to the more widely planted clones eg. RRIM 600 and GT 1. In the estates under AAR service, *Oidium* SLF is endemic in such districts as Segamat, Bahau, Karak and sporadic areas around Kulim and Ipoh, where wintering and refolia-

**Editor's Note: Dr. Soh Kim Gai ,ex-President of MACA (Malaysian Agricultural Chemicals Association) is currently ,with the International Fertiliser Association. in Paris. AAR News acknowledges Dr. Soh's and MACA's permission to print this article* which was first presented to MOPGC-ARC in 1989 tion can be protracted. Coupled with intermittent rain or thick morning mist, conditions become favourabe for the outbreak of this disease.

Trials conducted by RRIM showed that yield increase from control of *Oidium* SLF could range from 12.5% per year in a one-season trial to 33% per year in another trial carried out for four consecutive years. Indirect benefits from good control of SLF include saving on weeding, enhanced tree vigour and better bark renewal for long term better yield performance.

The traditional method for control of *Oidium* SLF depended on tractor-mounted dusters. As more rubber were relegated to terraced areas, this method of dusting became impractical due to insufficient roads for tractor to cover the whole field. Frequent machine breakdown also disrupted the dusting programmes.

Other methods recommended for control of *Oidium* include fogging with tridemorph-in-oil (Calixin) and aerial defoliation with suitable defoliants (Phytar, Folex, MSMA). Fogging machines were expensive and required tractors to cart around, and were not adopted. Aerial defoliation was not popular due to frequent change of pilot, inavailability of defoliants and ineffectiveness of MSMA against young leaves.

In view of the above problems portable dusters offer the solution at least in the short term. Recently, ACM introduced a light weight single operator (7.5 kg) knapsack mistblower (ACM 150 D x Mistduster) at $900 per unit.

It has a two-stroke, air-cooled, 3.8 h.p. engine using regular petrol mixed with 4% 2-T engine oil. Hopper capacity is 10 kg dust (or 13 litre solution for misting). Dust output maybe varied from 1kg up to 10 kg per min. and up to 15 m height.

Preliminary test indicated satisfactory sulphur deposition at 12.5 height. Sulphur was detected upto 18.4 m. The mid to low leaf storeys of about 10-12 m are most susceptible to SLF.

Some initial problems were uneven emission of sulphur dust and lumps in the hopper. Sun-drying, sieving of sulphur and insertion of a BRC wire mesh (1 cm.^{2})) inside the hopper eliminated the above problems.

Satisfactory sulphur deposi-

tion was seen on the immediate adjacent tree rows so that alternate tree rows dusting was possible.

Commercial dusting was carried out in early 1990 in 26 fields with chronic SLF in 11 estates. There were 16 control areas, either separate fields with similar cultivars or non-dusted sections in the dusted fields.

Prior to the exercise, group demonstrations were held to assist the estates on calibration, use and maintenance of the duster by AAR agronomists, the ACM engineer and technicians. Final instructions given to the estates were as follows:-

a) 4-5 rounds of dusting, each to coincide with bud-burst stage and sup plementary rounds in case of rain wash-out
b) 5-7 days rounds, depending on rate of refoliation
c) 9 kg of sulphur per ha
d) dusting during morning hours (6 a.m. or 7 a.m. to 11 a.m. or 12 noon)
e) walking in alternate tree rows
f) expected rate of cover age from 15 to 20 ha per day per machine with larger coverage for easier terrain.

In view of the early refoliation in 1990, most estates involved commenced dusting from early to mid-February. Generally 4-6 rounds were done, with negligible complaints of machine breakdown and rain interference. However, dusting intervals varied considerably, ranging from 5 days to 14 days, the longer intervals due to worker strikes, public holidays or just inadequate co-ordination from the management.

Canopy densities were assessed in April 1990. Density improvements of 20% to 40% were noted in 50% of the areas dusted, while another 23% showed moderate success with 15% improvement. The remaining 27% were similar to control. Estates which achieved satisfactory to good dusting results adhered very well to the recommended procedures, especially with respect to dusting interval.

Control of *Oidium* SLF in PB235 was more difficult, possibly because of its high susceptibility and protracted wintering and refoliation. Minimum dusting rounds for this clone would probably have to be increased to 5-6 rounds per season for effective control.

In wetter regions e.g. Tg. Malim district, *Colletotrichum* could be the more problematic agent for SLF for which sulphur is not effective for control. In such situations, *Oidium* infection will have to be ascertained prior to sulphur dusting.

From the above exercise, the ACM duster can be effectively used to control Oidium SLF, particularly for RRIM 600 and GT1 in *Oidium* endemic districts such as Karak, Segamat and Bahau. Dusting rounds would probably have to be increased for effective control of PB235 fields. Close supervision and adherence to recommended dusting intervals are crucial for good success.

Total cost (machine running and depreciation, material and labour) of sulphur dusting was $8.35 per ha. per round or about $42 per ha for 5 rounds per year. The economics of sulphur dusting is computed from a hypothetical model of 0 success to 5 successes over 5 years, with yield response of 10% in the first year and increasing 5% for every subsequent year, and using the current rubber price of about $2.80 for latex grade. Break-even occurs at 2 successes over 5 years of dusting. At 3 successful dustings, net present value of profit per ha is $232 over 5 years. This profit is doubled and quadrupled for 4 and 5 dusting successes respectively.

ONG,T.S.

PESTICIDES SAFETY AND HANDLING

Pesticides are chemicals which are meant for poisoning pests but human beings can also be poisoned through careless handling or long-term exposure to them. Mishandling or misapplication may result in acute poisoning or chronic ill-effects. These side-effects can be minimised only through strictly following the recommended safe and proper ways of using the chemicals.

The safe and effective ways to use pesticides are now based on the following factors:

a) Pesticides regulation
b) Precautionary measures
c) Dosage and waiting period after treatment
d) Residues and environmental pollution

A) Pesticides regulation

In Malaysia, the manufacture, import and marketing of pesticides are under the Pesticides Act 1974. It has banned several highly dangerous chemicals and also restricted the usage of others.

B) Precautionary measures

The key to safe use of pesticides is to strictly follow the recommended precautionary measures. These procedures are well-publicised and stressed in the mass media. The main points are as below:-

* Seek advise on pest problems and pesticides usage.

* Always read the labels and get advice before using a pesticide

* Follow recommendations on dosage, protective clothing and waiting period before harvest

* Always store pesticides in the original package away from food, children and animals

* Always remove clothing and wash thoroughly if contaminated by pesticide.

* Never use an empty pesticide container for storing food and drinks

* Never use a leaking or defective sprayer for spraying a pesticide

* Never use a pesticide for fishing or for poisoning non-target animals.

C) Dosage and waiting period

Only the right chemical at the correct dosage, target and time can ensure full effectiveness. Applying the right dosage of the chemical is important both for effectiveness and safety of the user. Never apply an overdose particularly on food crops as the consumers will get the extra toxic residue. Always follow the manufacturers' recommendations on the amount of chemical to use.

D) Residue and environmental pollution.

The chemical input in our agricultural system has increased tremendously over the past few years. In Malaysia today, we are using over $250 million worth of pesticides. We have over 1,000 pesticides and pesticide products available in the market. Abuses will cause environmental pollution. For instance, the mis-use of pesticides for catching fish from rivers and lakes will destroy not only the fish population but also the food chains. Chemical residues from farms and other ecological sources are known to destroy riverine fishes and prawn.

CONCLUSION

In short, we need to be very careful whenever we use a pesticide. We need experience and a general knowledge of the particular pesticide in use. We must observe a high standard of personal hygiene and the recommended precautionary measures for our own safety as well as the food consumers' and the environment.

Samsudin, A

PESTICIDES (HIGHLY TOXIC PESTICIDES) REGULATION 1989

A new Act proposed by the Department of Agriculture to regulate the use of certain highly toxic pesticides is now in the final stage of implementation. Highly toxic pesticides mean:

a) any of the substances listed in the First Schedule of Pesticides Act 1974 or

b) any preparation or mixture containing any one or more of those substances.

Currently, only three pesticides; paraquat, monocrotophos and calcium cynamide are listed under the First Schedule.

Under the proposed regulation, workers will not be allowed to handle highly toxic pesticides for more than eight hours daily. They are not permitted to handle these chemicals unless they have been informed of the hazards of doing so.

The regulation also requires disposal of toxic containers and warning signs to be put up at sites where highly toxic pesticides were being used.

The regulation also require employers to observe certain pre-requisites such as :

1) Provide and maintain protective clothing, equipment and washing facilities for their workers. Those who fail to do so can be fined up to $1,000 or sentenced to six months' jail.

2) Keep a record, for a period of not less than three years, of workers involved in the use of the highly toxic pesticides.

3) Provide each working team with a first-aid kit at the work site.

4) Institute a medical examination programme for all workers handling pesticides and keep medical records for a period of three years.

5) Train workers on the proper way to handle pesticides; and

6) Ensure that all highly toxic pesticides are stored in a locked and well-ventilated enclosure, accessible only to authorised personnel.

The proposed regulation is meant to create public awareness on poisonous substances and the safety of the user. It is not meant to stop us from using them. Apart from providing stricter supervisions and further training to the workers handling pesticides, our plantation industry should not be greatly affected as we are in compliance in most of the matters regarding pesticide usage.

Samsudin, A.

OTHER NEWS

AAR Sport's Club : AGM cum Dinner & Dance

The AAR Sport's Club Annual General Meeting cum Dinner & Dance was held on the night of 28th December, 1990 at the Kelab Shah Alam.

Below were some highlights of the programmes.

1) Election of 1991 Office-bearers
2) Karaoke Song Contest
3) Quiz and Riddles (Teka-Teki/Pantun)
4) Fancy Dress Competition
5) Arm-Wrestling
6) Coke Dinking Contest
7) Guess No. of OP seeds

The programme kicked off with the President of the Sports Club, En. Samsudin, giving a short and brief welcoming speech/ followed by presentation of the Annual Report. Along with the sumptuous buffet-style dinner, nominations for the 1991 office-bearers were carried out simultaneously.

At the start, the crowd were a bit cautious, but as the programme got into full swing, gone were the barriers, the nervousness, the apprehension. The momentum began to build-up when the Karaoke Song Contest took stage. Never mind the inexperienced, the first timers, or even when the

Susah betul ke, nak masuk AAR Guiness Record?

rendering of Engelbert Humpedinck's very own song "The Last Waltz" sounded otherwise. Didn't matter when the contestants got into "mid-way traffic jams", croaking all along the "Country Road" (what a long way to travel, poor guy) but were made up by our Charming Angels, as they charmed their way to some fine gentlemen's heart. There were some romantic moments as well as some heart-wrenching ones, when our pretty young lass, Mich, set some misty eyes around with her "Oh! My love, my darling , I've hungered for your touch... WOW! What sensations were stirred up! After this night, it's a sure bet we have launched some of you into the entertainment world. Any takers?

Seen the Battle of Giants? Look what we had. Battle of Minds and Battle of the Fittests. The Quiz and Riddles coupled with the Teka-teki/pantun were some of those more sober moments. With head to head buried deep in thought, some with sombre expression, tried their very best to crack the riddles while the more witty ones finished their pantun in a split second. There were many smiles around too, with gifts and prizes aplenty as their lucky numbers were drawn. As always, there were winners, there were bound to be losers, some unwittingly. Never mind, it's the fun that mattered.

Battle of the Fittest saw eight strong men and women vying for the AAR Guiness Record. It was no easy feat as the finalists found to their disappointments. With arm locked against each other, the seconds seemed to tick to minutes as each refuse to budge or give in. Then when everyone thought it was never going to end, it was "KILL"

The plot thickened. Slowly the music changed, quickening the tempo. In came our male impersonation of the Hula-hula girl dancer, Mr. Kana. Semi-nude, swarthed in shimmering robes of diverse colours, with his hip swaying and feet stamping to the rhythm of the beat, enchanted the judges. Followed closely behind, was the Booty Sucking Baby, the Dulang Washer, our Loan Shark, the Chettair, characters from the Wizard of Oz and the big and strong Mr. T. There were the Comedians, the Big and Little Clowns generously offering their bags of sweets and toffees, bribing their way to the prizes.

Oops! Suddenly the lights went off and the room was plunged in total darkness. Then came the chilly eerie shrill piercing through the silent night, "Hi! Hi! Hi! Where are you, Mr. Chew? I'm going to get you ......!", the evil-looking witch, with her "hodgee-podgee", cast her magical spell on the audience and sent shivers down the spine.

COME ON EVERYBODY!!! IT'S BOOGIE TIME

Finally, came the shy Indian Dancer. His admirer found his beauty too irresistible, rushed out to hug him, to the amusement of the crowd.

After a great time of good fun and entertainment, the new office-bearers were announced. With the closing speech from our newly elected President, with hope of better things for the year 1991, it was boogie to the music. Young and old took to the floor as they danced the night away.

As the music slowly died away .... in the early hours, with aching feet and tired minds, we trooped off, each to our very own destinations. What a Night! We carried with us memories of a beautiful night, to be cherished in our hearts for a long long time. To colleagues and friends, the success would not have been possible without your support, your participation and your presence. A NIGHT WE WERE ALL PROUD OF!

Below are the newly elected office-bearers for 1991.

President	Soh Aik Chin (Dr.)
Vice-President	Goh Kah Joo
Secretary	Michele de Silva
Treasurer	Patma

Eh Judges! You need help with these beauties......

Julie, Y.

AAR

Mr. Teo Chor Boo, AAR agronomist has been transferred to Sabah to supervise and conduct AAR trials there. He is based at Sri Kunak Estate, KDC.

The following AAR personnel have been promoted in 1991

Name	Present Grade ⟷	Previous Grade
Girlie Wong	Research Officer	Sr.Research Officer
Norfazilah	Gr.I (Non-Clerical)	Gr.III(Clerical)
Tan Piek Choo	Gr.III (Clerical)	Gr.II (Clerical)
Chong Siew Peng	Gr.I (Technical)	Sp. Grade
Anbarasu, K.	Gr.II (Technical)	Gr.I (Technical)
Mahendran, S.	Gr.III (Technical)	Gr.II (Technical)
Supramaniam, T.	Gr. I (Non-Clerical)	Gr.III (Technical)
Sandrasegaran, V.	Gr.II (Non-Clerical)	Gr.III (Technical)
Krishnan, K.	Gr.I (Non-Clerical)	Gr.III (Technical)

Congratulations! May they keep up the good work!