Session 4

Role and responsibilities of the private sector

PROMOTING SAFE AND EFFECTIVE USE OF PESTICIDES IN THE DEVELOPING WORLD: THE NEED FOR AN INTEGRATED AND CO-ORDINATED APPROACH

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ABSTRACT

In view of threats to both the continued supply of safe, affordable and sustainable food to the global community, and the maintenance of a healthy and acceptable environment, modern technologies (and specifically pesticides) are essential to production. Despite the introduction in 1985 of the FAO International Code of Conduct on the Distribution and Use of Pesticides, pesticide control continues to remain variable across the globe. Governments and others, often due to a lack of necessary resources, have done little to support the code and its principles.

However, during the past 7-8 years the agrochemical industry has demonstrated its determination to change. Company stewardship programmes have brought about considerable changes in pesticide marketing techniques and methodology which have been very beneficial both to the users and to the environment. Programmes of education and training in the safe and effective use of pesticides have also increased in number. Within a 3-year period, the GIFAP Safe Use Projects in Guatemala, Kenya and Thailand have taken a positive lead in demonstrating how approaches to pesticide use can be improved through appropriate stewardship techniques, the reduction of risks and the raising of levels of understanding relative to modern integrated pest management practices. The evaluations made after training showed that, in general, children and women are more receptive and ready to change their behaviour when health and safety are at stake. As clearly stipulated in article 3.8 of the FAO Code of Conduct, it is only through concerted and integrated collaborative effort between governments, international and non-governmental organisations, and the private sector that the benefits of modern technologies can be won, whilst at the same time reducing the risks.

INTRODUCTION

Living in the developed world, where basic food needs are largely satisfied and agricultural policy concentrates on the management of agricultural surpluses, makes it

difficult to talk with credibility about modern high-yield crop production. However we must all learn to take a broader view and face the global reality:

- Currently over 780 million people are undernourished and some 50 million people suffer severe food shortages each year. Two out of three children in the developing world are estimated to be underweight through lack of proper food (World Commission on Environment and Development, 1990).

- If a forecasted future population of 10 billion was fed using 1950s (low-input) crop technology, then we would need to plough 25-30 million square miles (the equivalent of South America, North America and Europe and much of Asia), simply to produce food (Avery, 1994).

- In 1993 world cereal production dropped by 4% to an estimated 1.88 billion tons. In 1994 the cereal output must rise by a minimum of 65 million tons (at least 3%) to avoid world stocks running down to unacceptable levels (World Commission on Environment and Development, 1990).

- Gains in rice productivity over the past 25 years are threatened by continued population growth and loss of crop land. Recent projections by economists of the International Rice Research Institute show that to maintain the current *per capita* consumption, the area of rice production must be more than doubled (Hossain, 1993).

The arguments for high-input agriculture appear to be vital not only for the future well-being and stability of our planet, but for the survival of millions still to be born. Crop protection is an integral part of current food production and must be analysed within the context of modern agriculture and sustainable development. If we are to avoid widespread famine and international turmoil, pesticides, certainly in the short term, must continue to play a critical role in high-yielding crop production until displaced by alternative technologies.

Despite the fact that in many less-developed countries legislation for essential control of pesticides is lacking (over 40% of all nations are without an official approval scheme or procedures governing the use of agrochemicals), the industry has demonstrated its determination to develop and promote safe and effective use of plant protection products.

Company stewardship programmes have brought about considerable improvements in research, manufacturing and marketing. Also, programmes of farmer education and training in the safe and effective use of pesticides have increased. In 1991, the International Group of National Associations of Manufacturers of Agrochemical Products (GIFAP), with the funding support of major agrochemicals companies and the Pesticide Trade Association in Japan (SACI), embarked on a series of Safe Use Projects in Guatemala, Kenya and Thailand. The Safe Use Projects aimed to demonstrate, through the principles of the FAO Code of Conduct (FAO, 1990), that it is possible within a limited period to improve understanding, control and effectiveness of pesticides through a co-ordinated, concerted and well managed effort involving all sectors of the community.

This paper analyses the progress achieved by some of these industry initiatives, and aims to encourage governments and international agencies to become future partners with the agrochemical industry in such collaborative efforts to ensure that the global community can

provide a continued supply of safe, sustainable and affordable food, and a healthy and acceptable environment.

IMPLEMENTATION OF THE FAO CODE OF CONDUCT

Despite the introduction in 1985 of the FAO International Code of Conduct, control of pesticides continues to remain highly variable across the globe. On one side, GIFAP members have signed on to the principle of the Code and, during the past 7-8 years, through company stewardship programmes there have been considerable changes in pesticide marketing techniques and methodologies which have been very beneficial, both to users and to the environment. Much more work needs to be done, but already the industry has demonstrated its determination to change.

In company stewardship programmes, we have seen the development of better and more effective controls on manufacturing and formulation, improvements to packaging, labelling and distribution, and the establishment of programmes of waste reduction and management. In addition, programmes of farmer education and training in the safe and effective use of pesticides have also increased. But during the same period, governments have done little in relation to the Code. Many, especially the governments of the less-developed nations, most of which lack the necessary resources, continually make pleas to donor agencies, aid bodies and international non-governmental organisations (NGOs) for funding, in particular to help support and train their people to establish pesticide regulation systems and legislation.

Most major agrochemical companies and GIFAP recognise the difficulties related to the safe and effective use of pesticides in the context of the developing world. It is because of this that dedicated effort and resources have been allocated to enable better understanding of the issues and suitable responses adapted to local conditions.

The correct approach toward Safe Use

Despite some variations between countries it is possible to point out many common aspects regarding the attitudes and behaviour of farmers. The fact that safe use is not spontaneously mentioned as a problem by farmers tends to prove that for many, safe use is a non-issue. This means that simply supplying information on safety is not enough to change attitudes and behaviour. One example of an industry survey in an area of the Dominican Republic typically showed:

- 92% of the surveyed farmers were aware that they should wear protective clothes;
- 80% realised they take a risk when not doing so; but only
- 24% claimed they wore protective clothes when spraying.

Globally, the reasons for such an attitude are:

- Safe use does not lead to direct economic benefits

- Farmers do not always bear the direct costs of unsafe application, e.g. drift to other crops or inhabited areas, or consumers exposed to residues

- Farmers have strong ingrained beliefs (*I have been dealing with pesticides for many years and I'm still feeling well*)

- There is a misconception of risks where inhalation is considered much more dangerous than skin contamination when applying pesticides in field crops

- Lack of inputs: easily affordable and comfortable protective clothing is often not available to the farmer

In some countries, farmer training programmes have had some impact through indirect approaches where safety has been translated into economic terms, through the introduction of protective gear adapted to the climate and pretested with the collaboration of farmers, and through the introduction of new packages which avoid direct contact with the concentrate. In areas where there is a high level of previous experience with pesticide contamination, references to these negative effects are used for farmer motivation.

Application techniques have contributed to the introduction and acceptance of safety. Crop-targeted spraying techniques with reduction of spray volumes and good maintenance of sprayers often trigger farmers' interest as they reduce product losses and increase product performance. The obvious impacts on safety, such as reducing soil contamination due to reduced application volumes, and minimising skin contamination by maintaining sprayers properly to avoid leakage, are often not the most appealing messages to get farmers involved.

Some early lessons learnt

In most less-developed countries the crop protection industry is the major source of extension at the level of the small-scale farmer. Long before the FAO Code of Conduct was established, companies produced media materials (posters, leaflets, etc) and established training modules on safety. However, several questions remain unanswered. How can implementation work in practice when so many well-meaning training programmes have difficulties in changing the behaviour of farmers when using pesticides? How can the industry provide more service in countries where profit margins are already squeezed, without losing competitiveness?

Several ingredients are required. Education specialists and anthropologists agree on proper surveying of target farmers to identify their needs, perceptions, expectations and sources of information and to set a baseline for monitoring impact. Changes in knowledge and attitude can be established through interviews with farmers. Changes in practical behaviour should be assessed through field observations, because claimed practice established through interviews may well differ from real practice: farmers are often aware of what they should do regarding safe use of pesticides and will be inclined to give the "right" answers to the questionnaire.

The participation of farmers in technology and programme development can adapt the technology to farmers' needs, create motivation, develop sense of ownership and ensure the long term sustainability of programme impact. Where farmers are organised (in co-operatives

for example), direct training of key farmers will provide results. Where farmers are not organised and are spread over a large area, mass marketing can make the best use of the commercial companies' expertise in promotion. Marketing key aspects of safety through a strategic mix of media can bring about dramatic changes in attitudes and behaviour. For example in Colombia, where an international company started a pilot programme to promote the use of protective clothing among the vegetable farmers of four villages in the province of Cundinamarca, an observation survey performed among 136 trained farmers has shown that the use of gloves during spraying increased from 40 to 76% after the start of the communication campaign.

Everyone benefits in the long term from optimised pesticide management at the small-scale farmer level. But it will only be achieved when government agencies, academia (universities, schools of agriculture), extension services and company representatives are all bringing a consistent and powerful message to their customers.

GIFAP SAFE USE PROJECTS

Objectives and structures

The GIFAP Safe Use Projects were aimed at supporting the principles of the FAO Code of Conduct (FAO, 1990), and were intended to act as blueprints for the future. They focused on meeting the increasing demand for food in the developing world by encouraging the creation of sustainable systems of agriculture, without encroaching on fragile ecosystems. They also supported integrated pest management (IPM) methods, where the techniques of pest control are chosen in the context of the associated environment and the economic significance of pest pressure. Started with a global budget of US$4 million on a 3-year programme (June 1991 to June 1994), these projects have yielded very encouraging results.

Local organisation and auditing

The projects began in 1991 with the appointment of three experienced agronomists in Guatemala, Kenya and Thailand. Initially, many questions had to be asked. What was the situation in the individual markets? What were the problems? How could they be best tackled? All aspects of the markets had to be audited so that starting points could be established; only then was it possible to set critical objectives aimed at major improvements in standards of pesticide understanding and management. The standards served as the basis for education and training, measurement of performance, enforcement and/or recognition and reward.

National government support

If the projects were to succeed, then the committed support of governments would be a critical ingredient of success. In addition to agricultural research and extension, this support included assurance that national legislation could back up the project's aims and objectives in each of the chosen countries.

Project scope

While education and training play a major role, the scope of activities required to achieve success is much broader, encompassing the additional dimensions of regulation,

promotion, problem solving, standards development, measurement, enforcement, rewards, recognition and fund raising.

Training and education

The list of those to be trained ranged from the trainers themselves to virtually everyone involved with pesticides from production to application. Education programmes for groups from schools, colleges and the medical services were also included.

For the projects to bring real benefits to the whole community, a massive communication exercise was needed. This has involved radio, television, discussion groups, the press, and general public awareness campaigns aimed at drawing attention to potential pesticide dangers alongside their community benefits. Training documents and basic messages continually referred to IPM concepts and the need to understand pest pressure and dynamics. The emphasis for all farmers and advisors was to use the best combination of cultural, biological and chemical methods that yield the most cost-effective, environmentally sound and socially acceptable pest management for a given crop situation.

Key achievements

Train the trainers

This programme, including industry, government services, school teachers, doctors and social security staff, was the first critical step in starting the "multiplier effect" process. In Guatemala and Kenya, all staff from agricultural extension and agrochemical companies received a one-week training course, and now offer training to farmers and retailers in the project concepts. In addition, in Guatemala farmer leaders within the Indian communities also received a train-the-trainers course to enable them to instruct and advise their peers in the villages. In Thailand, the Department of Agricultural Extension, using the GIFAP training manual, decided to prioritise Safe Use training for all levels of extension workers, retailers and farmers, to which they committed a budget of US$200,000 p.a. (Table 1).

TABLE 1. Thailand Safe Use Project.
Numbers trained between 1991 and 1994.

Programme	Numbers involved
Trainer training	2,200
Retailer training	623
Farmer training	450,000
Education	253 schools 65,000 students
Medical training	1,300 doctors 600 hospitals

Train the farmers

Farmers and farm workers were given practical training on a range of topics. They were taught to understand labels and how to assess when spraying was necessary; how to

store products safely, and how to apply products efficiently and effectively to the required minimum.

The number of farmers trained in the projects has already reached several hundred thousand. Standards are improving, with many now able to understand and identify toxicity, the nature and value of protective clothing, the interpretation of pictograms and treatment of poisoning, etc. The training programme included visits to model farms, and co-operation with farm estates and aid-financed development projects.

Radio

In Kenya, because of the scattered agricultural population and the relatively poor communications network, radio has become a useful tool to ensure that messages on effective management of pests reach a wide audience. A popular half-hour weekly serial on the life and times of a farming family has been designed and sponsored by the Safe Use Project. The serial carries messages on IPM and improved agricultural practices, along with prize-winning competitions to design posters and protective clothing for use in the field. According to the Kenya Broadcasting Corporation it is the most popular programme in their 40-year history, eliciting hundreds of letters each week from Kenyans and from listeners in neighbouring countries.

Schools' programme and women's education

Training those directly involved in cropping is, however, only part of the answer. It is of paramount importance -- especially in those areas where agriculture is a way of life -- to educate children and families on the hazards and importance of safety from an early age. Children form a key link in the chain, particularly in areas where adult literacy is low, as they are often the readers of labels and play an important role in the social conscience of the family.

In Guatemala, where two-thirds of children live in rural areas and actively participate in agricultural practices, the *Scarecrow Programme* has been widely used to educate over 60,000 school children. In Thailand, in addition to a similar schools' programme, GIFAP co-operates with CARE International, an NGO working at field level on personal protection and pesticide safety.

Generally speaking, children and women are more receptive and ready to change their behaviour when health and safety are at stake. In addition to specific training programmes directed at smallholder housewives, the Kenya Safe Use Project organised a contest to design and manufacture suitable protective clothing for women who were involved in spraying activities.

Medical programme

Unfortunately the use of pesticides will always carry some risk, and accidents can and do happen. The projects, therefore, include training on emergency procedures, as well as improved management systems for the infrastructure to respond efficiently to such situations. Doctors, paramedics and other medical staff have been brought up-to-date on methods of diagnosis and treatment of pesticide poisoning. Poison centres have been created or upgraded, and supplies of antidotes have been provided where necessary. In Guatemala, where statistics on chemical poisonings were poorly recorded, epidemiological record forms have been developed and information is now regularly received and analysed by a computer facility

provided by the project. The pesticide/toxicology database INTOX is now operational and used by the San Carlos University Toxicological Information Center in Guatemala City.

Certification of dealers

The projects also aimed at improving the standards of distribution networks and the advice communicated by retailers to end users. All retail operations in the three countries now have at least one trained member of staff, and in most cases the owner is also trained in modern pesticide advisory techniques.

However, certain elements will be difficult or even impossible in the short term to change, such as retailers located in urban zones, or small shops selling other goods alongside pesticides. This is the point where government-enforced guidelines or legislation are needed to back up the voluntary process of improvement. But major improvements are occurring: for example in Thailand the Department of Agriculture recently announced new legislation obliging all retailers to undergo training and accreditation before being permitted to sell pesticides. In Guatemala, AGRIQUIMA, the local pesticide association, with the Ministries of Agriculture, Health and Commerce, has embarked on a retailer certification programme where all dealers, after training, will be required to hold an official certificate if they wish to continue to sell pesticides. Over 100 dealers have already received certification.

Model farm concept

In Thailand, in conjunction with the Department of Agriculture's Pesticide Application Research Team, the Safe Use Project has established a model farm concept where old and unsafe spray methods have been replaced by more efficient and safer activities. For example, with accurate insect monitoring and scouting, the frequency of spraying has been reduced alongside a reduction in spray volumes (Table 2).

TABLE 2. Thailand Safe Use Project. Model improvements in pesticide application.

	Sprayer type	
Spraying system	Traditional boat sprayer	Improved airblast sprayer
Equipment	Pump + 2 hoses, open spray tank	Mounted adjustable Silvan nozzles, self-propelled, closed spray tank
Spray volume (l/ha)	3,125-3,750	625-1,250
Operator hours/ha	6.25	0.31
Application rate (ha/h)	0.48	4.2
Number of operators	3	1

Industry improvement programme

The Safe Use Project provides assistance to manufacturers, formulators, repackers and distributors to enable them to meet the standards as highlighted in the FAO Code of Conduct. The FAO Code, along with national legislation and GIFAP guidelines, has provided the

mechanism whereby pesticide companies can be audited for compliance. The audit covers structure and location, storage, packaging and labelling, employee safety, transportation and disposal and is managed by three expert groups. The results of audits have enabled many companies to improve their safety records, and most now conform to acceptable standards internationally.

Waste disposal

During the Safe Use audits, concern was raised over large stocks of unwanted pesticides. In Thailand, the project is currently working with Japanese companies on a new high-temperature waste disposal incinerator, to be completed by the end of 1995. In collaboration with the Pesticide Board in Kenya, a programme to remove and destroy obsolete stocks of pesticides is also under way.

Pesticide legislation

The need to apply and enforce adequate legislation applies as much to the registration and approval schemes as to the control of imports. In Kenya, after consultation with the Safe Use Project, the Kenyan Government is amending its Pest Control Products Act to improve registration procedures in compliance with the FAO Code of Conduct, and has recently recruited more inspectors within the Pest Control Product Board in order to enforce the legislation.

In countries where food exports to developed countries face more and more stringent import regulations on residue limits, full compliance with such limits is the key to many of these countries' economic development. Educating the producer is the only practical response to this issue. Various seminars have been held on maximum residue limits for the Fresh Product Exporters Association of Kenya, under the American-sponsored Kenya Export Development Support Project, and more are to follow. The fresh-fruit companies are also offering to support training programmes for their own staff and their outgrowers.

THE FUTURE

It has only been possible to give a flavour of the multiplicity of activities being carried out in GIFAP's three Safe Use Projects, but the potential to improve the way pesticides are used through appropriate stewardship techniques, and to reduce risks and raise levels of understanding of modern IPM practices, has been clearly demonstrated. There is now a desperate international need to take advantage of the lessons learned in Guatemala, Kenya and Thailand. The task is too large for the agrochemical industry to shoulder the burden alone and, as has been demonstrated in the pilot countries, success is dependent on the involvement and commitment of governments, and all those involved in pesticides, working together for a common cause.

Article 3.8 of the FAO Code of Conduct states that

> "concerted efforts should be made by governments and pesticide industries to develop and promote integrated pest management systems, and the use of safe, efficient, cost effective application methods. Public-sector groups and international organisations should actively support such activities" (FAO, 1990).

The GIFAP Safe Use Projects are designed to meet the requirements of sustainable agriculture; they are not contrary to, but complementary to IPM practices. Even if chemical products are considered as the last resort in pest control, they must still be used effectively and safely for the essential protection of people and their environment.

The agrochemical industry is pleased to have been a partner in these three Safe Use Projects. It is also happy to help in the design and implementation of such projects in other less-developed countries. Now is the time for governments, international agencies and supportive NGOs to play a key role in co-operating with the agrochemical industry to ensure that the benefits of such modern technology as pesticides can be obtained in a safe and effective manner. By working together, standards can be raised and technology can be used to the benefit of rural communities world-wide. It is only by such concerted and integrated collaborative effort that the global community can ensure the continued supply of safe, sustainable and affordable food and a healthy, acceptable and secure environment for us all to live in.

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DUE DILIGENCE: THE CHALLENGE TO EXPORTERS IN THE DEVELOPING WORLD

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ABSTRACT

The UK Food Safety Act (1990) requires all food suppliers to exercise *due diligence* to avoid committing offences relating to food safety. The exact requirements of *due diligence* under the Act have yet to be established by Case Law. Nevertheless, Mack Multiples Division has set out a clear policy to assist its suppliers in less-developed countries and to discharge its perceived duties under the Act, which include visits to all suppliers, clear records, clear audit trail, residue testing and the development of integrated crop management systems. The results of this work thus far, if measured by microbiological testing of products consumed whole, such as grapes, plus the residue analysis of items such as melons, bananas, grapes, pineapples, avocados, etc, have shown a complete absence of any residue problems. Mack aims to refine continuously and improve its systems to meet the requirements of both the UK multiple retail outlets and the law, but increasing restrictions on the use of pesticides may lead to a change in the cosmetic characteristics of produce.

INTRODUCTION -- FOOD SAFETY LAW

The UK Food Safety Act 1990 (Anon., 1991a) requires any person who sells food for human consumption to ensure that it complies with food safety requirements - including "not only the probable effect of that food" but "the *probable cumulative* effect of food". If a food supplier were to be charged with an offence under the Act, in his/her defence that supplier would need to prove that all reasonable precautions had been taken and all *due diligence* exercised to avoid the commission of the offence. Conviction under Section 33(i) of the Act carries a maximum of 3 months imprisonment, or a fine not exceeding level 5 on the standard scale. Conviction on indictment under any other section gives liability for imprisonment not exceeding 2 years and a fine, depending which section is infringed, not exceeding £20,000. If the offence was committed with the consent, connivance etc, of an officer of the company, that individual, as well as the company may be punished.

The need for legislation to meet public demands and allay fears was amply demonstrated in the 1989 case of Chilean grapes alleged to be contaminated by cyanide (Anon., 1991b) which caused the immediate withdrawal and destruction of $180 million worth of fresh grapes. With no due diligence system in place, all Chilean grapes were suspect. More recently (Anon., 1992a) we have seen the press and public reaction over the misuse of aldicarb on Irish cucumbers.

This concern is manifested in the UK supermarkets seeking a reduction in the use of crop protection chemicals either in a systematic way (Ridge, 1991) or by a steady pressure

for the introduction of Integrated Crop Management Systems (Spriegel, 1993).

A POLICY FOR QUALITY ASSURANCE

In the absence of any significant number of prosecutions under the Act -- in fact the only case of a Section 21 "Due Diligence" defence is still under appeal -- we have to make our own interpretation of the requirements.

This policy is incorporated in the *Mack Quality Assurance Manual* (Legge and Bugler, 1994), and we seek to offer focused technical support to our overseas suppliers, without removing their responsibility for producing the crop using entirely safe practice. Item 2 of the Mack Objectives states that we shall .... "Provide for both Mack customers and suppliers the expertise required in the technical and quality assurance spheres, and to provide continuous feedback between the three partners" (the producer, the importer/distributor, and the retailer). Item 3 requires us to "identify and develop suppliers who can fulfil the requirements of customers in all aspects of their production -- hygiene, social, safety, varieties, systems, packhouses and handling/quality assurance". Item 4 states we must "Continuously monitor and aim to improve all aspects of post-harvest handling and holding". With Item 5 we seek "To ensure technology transfer to our suppliers to enable them to maintain high standards in production, handling, product development and packaging".

FOOD SAFETY POLICY MANAGEMENT

Mack make the following recommendations for management of food safety policy:

- Importers' staff should visit all suppliers in all source countries with especially detailed technical support given to new suppliers in the developing world.

- It is important to carry out detailed annual audits on all volume suppliers, to confirm that hygiene, handling and safety all meet customer requirements, and to confirm as far as is possible that only "approved" pesticides as listed by the responsible Authority in the country of production are used on appropriate crops in the specified rates and manner and that no pesticides which are cited in the current edition of EC Prohibition Directive 79/117/EC (Anon., 1994; Table 1), or in the equivalent UK list of severely restricted pesticides (Anon., 1992b), are proposed for use.

- A brief audit should be carried out on every visit, and all visits are logged in a quality assurance database.

- All packages should be code/lot marked to facilitate a full audit trail, and "Hazard and Critical Control Points Analysis" surveys conducted on each product line.

- Wherever available, suppliers should be encouraged to utilise local analytical laboratories for microbiology tests on water supplies -- both irrigation and packhouse, plus residue testing for both pre- and post-harvest crop protection chemicals. For

TABLE 1. Banned pesticides in the EC Prohibition Directive (79/117/EEC, as amended).
Under the Prohibition Directive, the following susbtances "may be neither placed on the market nor used".

Mercury compounds	Persistent organo-chlorine compounds	Other compounds
Mercuric oxide	Aldrin	Ethylene oxide
Mercurous chloride (calomel)	Chlordane	Nitrofen
Other inorganic mercury compounds	Dieldrin	1,2-dibromoethane
Alkyl mercury compounds	DDT	1,2-dichloroethane
Alkoxyalkyl + aryl mercury compounds	Endrin	Dinoseb, its acetate and salts
	HCH containing < 99% of the gamma isomer	Binapacryl
	Heptachlor	Captafol
	Hexachlorobenzene	*Dicofol containing < 78% of p.p. dicofol or > 1 g/kg DDT and DDT-related compounds
	Camphechlor	*Maleic hydrazide: (a) its salts other than its choline, potassium and sodium salts; (b) its choline, potassium and sodium salts containing containing > 1 mg/kg free hydrazine expressed on the basis of the acid equivalent
		*Quintozene containing > 1 g/kg of HCB or > 10 g/kg pentachlorobenzene

*N.B. These pesticides are not expressly banned if the stated purity requirements are satisfied.

example, this work is augmented by Mack's own routine survey work in the UK and is designed to counter both cholera and pesticide abuse scares, and confirm the operation of "best practice".

- Farmers are encouraged to minimise their use of agrochemicals and to adopt integrated crop management systems, a move strongly supported by the UK multiple retail outlets, and to re-cycle crop residues where this does not constitute a pest or disease hazard.

- It is useful to provide a Code of Practice on the use of pesticides by suppliers. For example Mack provides such a code (Anon., 1994). In addition a list of UK/EC banned or severely restricted pesticides (Anon., 1992b) and current **maximum residue levels** (MRL) for relevant crops should be provided. Suppliers should be encouraged to participate in any available training schemes for spray operators; for example, it is a requirement of Mack suppliers that spray diaries are maintained and made available for inspection during visits.

RESULTS

Such policies can only be successful when they are developed in total cooperation with overseas suppliers and perhaps by being used to reinforce GIFAP "Safe Use" initiatives (Ledru *et al.*, this volume). The Irish cucumber incident (Anon., 1992a) has shown very clearly the commercial and legal risks if there is a lack of safeguards in this area. The Technical Director's responsibilities start before a seed is sown and only end when a consumer has been satisfied by eating the product. For example, in discharging these duties, the Mack Technical Director in 1993 made 30 visits to 15 countries spending 172 days overseas, whilst Product Managers also made many visits reinforcing the policy. It is a vindication of this system that examination of the last three years of records shows no MRL exceeded on our products from less-developed countries. Most of our results show no pesticides detected, but where they are, they fall most often around the 10% of MRL figure.

CONCLUSIONS

A rigorous approach is necessary to address successfully the requirements of the UK Food Safety Act 1990. This approach has several benefits for suppliers overseas. Firstly, it creates increased awareness of the requirements of all the leading UK multiple retail outlets, who represent nearly 70% of the UK produce market. Secondly, achieving these standards of control opens up all the other markets of Europe which will be affected by similar legislation likely to be adopted by the European Union in the near future.

A programme of continuing education, training and visits is necessary to support such an approach for the foreseeable future, as legislation on MRLs, permitted pesticides and crop clearances is only likely to become more restrictive. These changes may lead to the UK consumer needing to be educated to focus less on the cosmetic qualities of his/her fresh produce, and more on its intrinsic quality and value in a healthy diet. Above all the challenge is to supply food which is safe to eat and to avoid genuine food scares which could be attributed to imperfect or poor controls at that part of our food supply which originates in the developing world.

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