Paraquat – Syngenta's controversial herbicide

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Summary

Paraquat is Syngenta's most controversial pesticide. It is widely promoted by the company in both developing and industrialised countries. But the health risks from paraquat are acknowledged worldwide. A new investigation from Malaysia shows the daily hazards to workers who spray paraquat on a regular basis. Interviews with workers on Indonesian estates confirm the misery of routine exposure, which place plantation workers and small-scale farmers in an intolerable position.

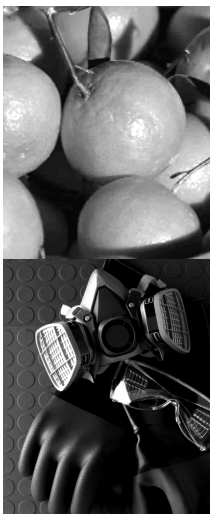
The Berne Declaration, Foro Emaús, Pesticide Action Network Asia Pacific, Pesticide Action Network UK and the Swedish Society for Nature Conservation are launching this report to draw attention to these global concerns, and demand action to phase out paraquat products.

Paraquat can not be used safely, particularly not on plantations and small farms, and there is no antidote. People are dying while others are left seriously ill. The most severe health effects are found in developing countries where workers suffer from damage to lungs, skin, eyes, nose, fingernails and toenails. There are also concerns in the industrialised world and one can not disregard the environmental effects.

This report examines Syngenta's association with paraquat. Paraquat has been criticised for the adverse impacts on workers since the 1960s. The company's new paraquat factory in China shows that the management has dismissed important objections and concerns for a long time.

Paraquat is already banned or severely restricted in eleven countries. The report asks whether agriculture needs paraquat, given the many alternative ways of controlling weeds. It is time to take global action and remove this old pesticide from the market. The report demands Syngenta to:

- Phase out the promotion and sale of paraquat products in developing countries within three years.
- Cooperate with national initiatives to ban paraquat.
- Reassess the toxicity classifications to reflect the lack of an antidote and the danger of death from acute poisoning.
- While sales remain, ensure all products are sold in returnable containers, and that all formulations contain the warning dye, emetic and stenching agent.
- Allocate greatly increased resources to develop agricultural products that contribute to safe, ecological and sustainable agricultural production worldwide, and phase out the production of paraquat and other hazardous pesticides.



1. Setting the scene

Syngenta is the world's largest agrochemical corporation, with a share of approximately 20 per cent of the pesticide market. Its interests encompass a wide range of agrochemical products and seeds, particularly genetically engineered varieties. The last ten years have seen increasing concentration in the agrochemical industry, and Syngenta was formed when the Boards of the Swiss company Novartis and Swedish-British AstraZeneca decided to merge their agrochemical and seeds interests, setting up the first global, dedicated agribusiness company.[1] In spite of what the company described as 'a difficult market' in 2001[2], sales totalled US$6,323 million (see table 1).

Herbicides, or pesticides that kill weeds, make up the major share of the agrochemical market, with sales in 2000 reaching approximately $14 billion, about half the value of the world pesticide market.[3] Syngenta has a 17 per cent share of the herbicide market, through its sales of both selective (designed to kill specific weeds) and non-selective herbicides that will kill most plants.

Herbicide sales form 38 per cent of the Syngenta business. The most important of its products is paraquat, a controversial non-selective herbicide, sold in over a hundred countries under the trade name Gramoxone. The company describes Gramoxone as the world's second largest selling agrochemical.

Although sales and profits of paraquat products in developing countries are not divulged by Syngenta, being considered 'commercially sensitive information'[4], these markets are important for profits. In 2000, Syngenta reported that: "Market expansion due to the substitution of manual labour in Asia and increases in herbicide-tolerant crop plantings in the US market continued to drive sales of Gramoxone and Touchdown".[5] Touchdown is the trade name for glyphosate-trimesium, developed by Zeneca to challenge the biggest selling herbicide worldwide, glyphosate, which is marketed as RoundUp by rival Monsanto.

Paraquat was first synthesised in 1882 but its herbicidal properties were discovered only in 1955 by ICI (forerunner of Zeneca). It has a tarnished reputation because of its acute toxicity, lack of an antidote, and ill-health associated with operators, particularly on plantations of developing countries. Neither the Annual Report 2001 nor the Annual Review 2000 say that Gramoxone contains paraquat. The company refers to Gramoxone's "unique combination of benefits. Around the world, it is helping to improve crop yields, raise productivity and reduce the need for extensive manual labour. This is the herbicide which first made possible the concepts of minimum tillage, conservation tillage and 'no-till' farming … (Gramoxone) is approved by governmental regulatory bodies in over 100 countries. Growers use Gramoxone to protect and develop over 50 different crops across the world's major agricultural regions".[6]

But pesticide specialist Barbara Dinham, director of Pesticide Action Network (PAN) UK pointed out: "There are many different ways to control weeds. Organic and other agroecological systems have developed successful techniques. Farmers have used the equivalent of conservation strategies for hundreds of years, and it is highly misleading for the company to claim that paraquat first made possible the con-

Table 1. Syngenta sales of pesticides and seeds (US$ million)	2001	2000
Pesticide sales by region [8]	*Sales*	*Sales*
Asia and the Pacific	951	1,039
Latin America	677	850
Europe, Africa and Middle East	1,870	1,991
NAFTA countries (US, Canada, Mexico)	1,887	2,008
Total pesticides	*5,385*	*5,888*
Seeds	938	958
Total pesticides and seeds	*6,323*	*6,846*
Herbicide sales [9]		
Selective herbicides (killing specific weeds)	1,722	1,841
Non-selective (including paraquat)	687	760
Herbicides as a per cent of sales	*38%*	*38%*
Profits from pesticides and seeds[10]	Profits	Profits
Gross profit – pesticides	2,645	2,874
Operating income – pesticides	738	866
Gross profits – seeds	479	462
Operating income – seeds	71	3

cepts of low-till systems. Farmers using herbicides in a low-till system have made savings and reduced their overall costs, but it is wrong to imply that there is no need to continue making improvements that reduce dependence on chemical herbicides."[7]

Pesticide use in developing countries

Pesticide use in developing countries has grown over the last 20 years, with international pressures, especially the trend towards trade liberalisation, accounting for much of the increase. Since the early 1980's the World Bank and the International Monetary Fund have insisted that developing countries implement structural adjustment programmes if they wanted aid, investment and debt relief. The cultivation of more crops for export is part of these programmes. Export crops produced in monoculture systems for example bananas and cotton, normally require far higher applications of pesticides than food crops for domestic use.

Commercial pressures are an important factor in the growth. The major producers of pesticide are all based in Europe and the United States. The better-off developing countries are seen as expanding markets, although a slowdown has been recorded in the last two years, with sales of agrochemicals falling in 2000 for the second year running, and the trend may be repeated in 2001. Farmers bought fewer pesticides because of low commodity prices and low farm incomes. In poorer countries, old pesticides are cheaper than new chemicals and are frequently marked for a broad spectrum use.

Trade liberalisation has encouraged export production and lowered import barriers. This stimulates commercial pressure and unless farmers are offered alternative strategies this leads to increased pesticide use. With these pressures and open markets, poorer farmers seek the cheapest, usually more toxic, pesticides.

The growth has posed additional hazards for many of the world's poor. According to the International Labour Organisation (ILO), the estimates made in 1994 indicate there were two to five million annual occupational cases of pesticide poisoning, with 40,000 fatalities.[11] In some countries pesticides cause 14 per cent of all

occupational injuries in agriculture and 10 per cent of fatalities.[12]

Recognising the problem, governments meeting in 1985 at the Food and Agriculture Organisation of the United Nations (FAO) agreed an *International Code of Conduct on the Distribution and Use of Pesticides* (FAO Code), which sets standards for both governments and industry in dealing with pesticides. The agrochemical industry has signed up to the Code, with the industry organisation (now called CropLife International) making compliance a condition of membership. All the major agrochemical industries have accepted the Code: with the Syngenta fore-runners Zeneca and Ciba Geigy playing a leading role to introduce 'product stewardship' to implement their obligations. Nevertheless, pesticide hazards remain high in developing countries.

The health and environmental impact of pesticide use are likely to be more severe in developing countries. Many governments lack the resources to legislate and monitor the use of pesticide. Water supplies and land are both at risk. Users often find it difficult to use pesticides according to instructions: they are generally inadequately trained in the use of compounds, they may be illiterate and unable to read the safety precautions, or labels may not be in a language the user understands. The users may be unable to afford the protective clothing needed for spraying and there is also the discomfort of wearing protective clothing in hot weather. Around 30 per cent of pesticides marketed in developing countries do not meet internationally accepted quality standards set by the FAO. The problem is most acute in Africa, where quality control is weakest.[13]

The economic and social impact of pesticides on small-scale farming communities in developing countries is profound. When users are not trained, pesticides can lead to a treadmill of increasing use, debt and in some cases to lower yields.

Industrialised countries have not overcome all the problems of pesticide use. Most users do not comply with the specified personal protective equipment. There are chronic and delayed health effects, such as that experienced by sheep dippers in the UK, and in the US some agricultural pesticides, such as chlorpyrifos, have been banned because of concerns with the impacts on children.[14] With these difficulties in richer nations, it is not surprising that the problems are magnified in poor countries, and even more so for poor users.

“Around 30 per cent of pesticides marketed in developing countries do not meet internationally accepted quality standards set by the FAO”

Corporate influence in agriculture

A small number of international agribusiness corporations dominate production and trade in agricultural inputs, such as chemicals and seeds. They sell seeds, fertilisers and pesticides to farmers, patent new crop varieties and are involved in plant genetic engineering and plant and animal breeding. “The major agrochemical companies are engaged in a cut-throat battle to maintain their share of profits from agriculture – while having a common interest in the overall expansion of the market for their products”, says Barbara Dinham.[15]

Consolidations in the industry have meant that the number of major agrochemical corporations has fallen from ten to six in the past four years. The six companies – Syngenta, Monsanto, Dow, Bayer (which acquired Aventis in October 2001), BASF and DuPont – between them control 80 per cent of the pesticide market. Four companies – Du Pont, Mitsui, Monsanto and Syngenta – hold over 70 per cent of the patents on the six leading staple foods namely rice, maize, wheat, potato, soybean and sorghum.[16]

Effects of pesticide use in developing countries

Poisoning and health concerns

Pesticides are responsible for some 20,000 accidental deaths each year, and 200,000 suicide deaths, according to the World Health Organisation (WHO).[17] They also account for about three million cases of acute poisoning each year, although this may be a conservative estimate and is lower than the ILO estimate noted above. Not all poisoning is reported.[18] In fact, a recent study in Nicaragua showed a 98 per cent under-reporting in the best surveillance system of Central America.[19]

The people most severely affected by pesticides are agricultural workers on plantations and large estates whose full time job is to spray pesticides. Many untrained small-scale farmers in developing countries use pesticides weekly, or more often. People working in sprayed areas and all who handle pesticides, or are in close proximity, are also at risk. Accidents and death arise from exposure to toxic pesticides, accidental spillages, leaking or poorly insulated knapsack sprayers, consumption of contaminated food – for example, grain contaminated with cotton pesticide where the two are grown close together – drinking from a container which has been used for mixing pesticides, and accidental or deliberate ingestion. Lack of washing facilities such as showers, running water and soap compound the problems.

If workers fall ill and are unable to work because of pesticide poisoning they can be sacked and lose their source of income. There have been cases of pesticide applicators only being employed for six months, 'a tacit admission of health-related problems'.[20]

Birth defects, sterility and cancers have resulted: 160 pesticide active ingredients have been classified by recognised authorities as being carcinogenic to some degree and 118 pesticides have been identified as disrupting hormonal balance.[21]

Pesticides are readily available to people suffering acute depression or humiliation, with heavy and unpayable debts for example. An overview of the major public health problem of pesticides as a result of both accidental and intentional exposure found that paraquat has been reported to be a problem in many parts of the world, including Brazil, the Caribbean, Dominican Republic, Ecuador, Fiji, Guadeloupe, Korea, Malaysia, Mexico, Nigeria, Papua New Guinea, Reunion, Singapore, Sri Lanka, Surinam, Taiwan, Thailand and Western Samoa. [22] A study found that 14 per cent of deaths among 10 to 50-year old females in Bangladesh were due to poisonings, 'the majority following suicidal ingestion of pesticides'.[23]

In some countries, agricultural workers are increasingly aware that pesticides can bring serious health problems and are becoming interested in safer alternatives.

Environmental concerns

Chemical pesticides "are the only toxic chemicals deliberately introduced into the environment."[24] Widespread environmental problems have resulted, including contamination and pollution of local water supplies, fish losses, soil degradation, deaths of animal wildlife, insect resistance and the destruction of flora and fauna. The excessive use of fertilisers and pesticides in areas with highly intensive agriculture is leading to a degradation of water quality.

Small amounts of pesticides can cause significant damage the environment. In the UK a spill of the pesticide chlorpyrifos resulted in concentrations of less than 0.001 parts per million (equivalent to one drop in ten Olympic size swimming pools) in a river, but was sufficient to kill river bed invertebrates and cause serious harm to fish, which were found alive but with their backbones protruding.[25] The European Drinking Water Directive sets a maximum concentration of any pesticide in drinking water at 1 part in 10 000 million. In a farming area of the UK, high levels of use of the herbicide atrazine polluted a large Midland reservoir to such an extent that treatment facilities had to be taken out of supply for months while the pesticide degraded naturally.[26]

An ongoing study in Costa Rica has found high residues of multiple agricultural and domestic pesticides in soil, drinking water, home

dust, and dust taken from children's mattresses in houses and a school near a banana plantation.

Highly hazardous stocks of obsolete pesticides pose "a serious threat to the environmental and public health".[27] Such stocks total over 20,000 tonnes in Africa and at least 100,000 tonnes in all developing countries. The conditions under which these are stored rarely meet internationally accepted standards. Many pesticide containers deteriorate and leak their contents into the soil, contaminating both the land and groundwater.

Agriculture and poverty

Some 70 per cent of people in developing countries live in rural areas and most earn a living in agriculture or related activity. Around 800 million are chronically short of food, according to the UN Food and Agriculture Organisation (FAO), although the world produces more than enough food to feed everyone adequately.

Lack of food is not caused by the lack of output but by low incomes and unequal access to resources such as land, water and markets. Millions of the poor are either landless or have only small plots of land; they cannot afford to buy the food that is available. People can go hungry in villages where local markets are brimming over with food. In most rural areas, there are few jobs outside agriculture, and the growth rate in rural non-farm employment is low. This means that few have the chance to earn an income that will enable them to buy the food they need.

Lack of money is one of the most important factors hindering both urban and rural people from obtaining the diverse foods needed for an adequate diet. Even when poor rural families are helped to produce a greater variety of foods on their household plots, they will often sell these items rather than consume them because of their high market value. Systems of agriculture that work for the poor can make an important contribution to overcoming poverty.

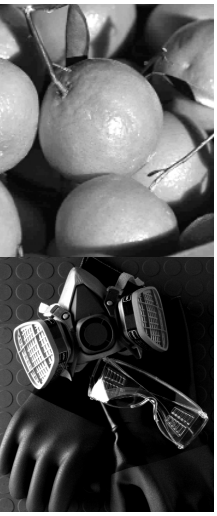
Agriculture is however more than just another economic activity; it plays a variety of different functions not only by producing crops and animals but also providing jobs and stimulating rural economics. Agriculture is a way of life that services a deep human need, the provision of food.

Agriculture in the context of development strategies

While the majority of the population in developing countries live in rural areas, agriculture is often afforded low priority by governments. Development strategies place more emphasis on industrialisation, modernisation and diversification. The need to repay foreign debt has put pressure on the sums available to agriculture. Development aid to agriculture almost halved between 1988 and 1999.[28]

Within the spending that has been earmarked for agriculture, priority has tended to go to crops for export, rather than to domestic food crops and the elimination of hunger. In May 2001 an FAO paper charged both developing and developed countries with failing "to demonstrate their commitment to set aside the resources required to achieve the eradication of hunger in all its dimensions … there has been a conspicuous lack of focus within poverty reduction strategies on food security issues."[29]

There are signs that the relative neglect of agriculture is being recognised. In 2001 African leaders shaped a 'New Partnership for Africa's Development', for example, which says: "Improvement in agricultural performance is a prerequisite of economic development".[30] The question arises whether this will increase the use of hazardous pesticides under inappropriate conditions in developing countries, or open opportunities for more sustainable strategies.



2. Paraquat concerns

Health issues

Accidental poisonings

"The only highly toxic herbicide of the post-war years" is how the World Health Organisation has described paraquat.[31]

Paraquat poisoning is a severe health problem in many developing countries. Highly toxic via ingestion, one teaspoonful of paraquat is fatal. Following ingestion of very small amounts of the liquid concentrate, pulmonary oedema, cardiac failure, renal failure, liver failure and convulsions caused by central nervous system involvement, can occur. Under these circumstances, death from multiple organ failure may follow within hours or days. There is no antidote.[32]

The greatest risk to workers of fatal and serious accidents is during mixing and loading where contact with concentrate occurs, but fatal accidents have also been described due to prolonged contact with the diluted paraquat spray during application. Conditions of use in many developing countries make it difficult to follow label instructions and recommendations. Workers on estates are frequently employed as sprayers for six days a week, ten months a year, and therefore have a high degree of exposure to the chemical.

Paraquat drift from spraying has also caused health and environmental problems. For example, a diluted paraquat mixture was applied in April 1991 to two fields near Hollister, California. "Drift from these applications passed directly over the community residences and the associated complex which included gasoline service stations, restaurants, a recreational narrow-gauge railway, and an outdoor barbecue pavilion and eating area". Following complaints by residents, a survey was undertaken to determine if any health consequences resulted from the drift. The survey found an increase in coughs, eye problems, diarrhoea, irritation, headache, nausea, rhintis, throat infections, breathing problems, unusual tiredness and wheezing.[33]

"If swallowed, burning of the mouth and throat often occurs, followed by gastrointestinal tract irritation, resulting in abdominal pain, loss of appetite, nausea, vomiting, and diarrhoea. Effects due to high acute exposure to paraquat may include excitability and lung congestion, which in some cases lead to convulsions, incoordination, and death by respiratory failure. Other toxic effects include thirst, shortness of breath, rapid heart rate, kidney failure, lung sores, and liver injury".[34] Respiratory adult distress syndrome due to lung fibrosis is usually the cause of death. Reduced lung capacity is also reported (see case study of South Africa).

Accidental paraquat poisoning may occur under a variety of circumstances, although the border "between occupational and non-occupational accidental exposure is not always easy to distinguish".[35] In occupational use, poisoning can occur through the skin, sometimes during knapsack spraying. The presence of scratches, cuts or sores on the skin substantially increases the risk. The confusion of paraquat concentrate or solution due to inappropriate storage in soft-drink, beer or other bottles has apparently lessened in recent years but still occurs.

The accidental poisoning of children is of acute concern. In Latin America children are

often given the job of carrying spraying equipment. A US Environmental Protection Agency study (to determine oral exposure of children from containers for garden use) analysed paraquat residues of diluted spray on nozzles and nozzle discharge, and concluded that there is a potential hazard.[36] In Costa Rica, between 1991 and 1995, "the exposure circumstances of severe and fatal poisoning in children aged 1-6 included the cases of two toddlers placing respectively a rinsed spray jet and a bottle top into their mouths, two cases of confusion of bottles stored in the kitchen, two cases of children playing with empty bottles, and a 7-year old sister giving 'cough medicine' to a younger brother".[37]

Long-term and delayed health effects may also occur, including Parkinson's disease, lung effects and skin cancer. "Regulatory agencies have not fully recognised either the inherent toxicity of paraquat for human beings or the particular risks derived from exposures in developing countries." [38]

In spite of its high toxicity and the lack of an antidote the WHO classified paraquat only as moderately hazardous. It is classified as 'highly' hazardous in the United States.

Occupational injuries: nails, skin, eyes, nose, nausea

"I could not continue, I was sick. The work makes one feel nauseous. I also had trouble with my sight and my fingernails fell out during my work, also my toenails" says former banana plantation worker in Honduras.[39]

Continued exposure to paraquat, as encountered by sprayers on plantations, affects the skin, eyes, nose and fingernails. Diminished eyesight and common nosebleed have been reported.

Skin problems include mild irritation, blistering, ulceration, peeling, necrosis (cell death in skin tissue), dermatitis of the hand and blistering in scrotal areas, from leaking sprayers soaking trousers.

Severe exposure on hands has resulted in nail damage, ranging from localised discolouration to temporary nail loss. According to US Environmental Protection Agency (EPA), paraquat causes moderate to severe eye irritation. Eye injuries include blepharitis (eyelid inflammation), conjunctivitis, ulcerations or keratosis (growth like a wart) of the cornea. Nosebleeds can also occur.

Skin, nail, and eye lesions have been reported, including in children.[40–46] Workers in formulating factories are at high risk. A survey among 18 paraquat formulation workers in the UK found that 14 (78 per cent) had experienced nail damage, nosebleed, or skin lesions. In Malaysia, 15 out of 18 formulators had topical lesions, such as dermatitis or chemical burns (50 per cent), and eye injury or blepharitis (39 per cent).[47]

In Costa Rica, hundreds of paraquat injuries occur each year, most of them in the banana producing Atlantic Region. In the most recent survey, the majority (60 per cent) of victims suffer from skin burns or dermatitis and 26 per cent eye injuries. The remaining 14 per cent had systemic poisonings, nosebleeds and nail damage.[48] Excesses of different skin cancers (lip, penile cancer, non-melanomous skin cancer and skin melanoma) were found in coffee growing regions, as well as an excess of skin melanoma in men in the banana producing Atlantic region.[49] Another study of Costa Rican banana workers also found an increased risk for skin melanoma.[50]

Paraquat breaks down the natural skin barrier after prolonged or repeated use, and could result in a much higher absorption of the product. The Material Safety Data Sheet produced for Gramoxone extra by Zeneca USA describes the effect: "Intact skin is a very effective barrier to paraquat. If extreme damage occurs this barrier is removed and, in the presence of sufficient paraquat, absorption of toxic amounts may occur. Repeated and/or prolonged skin contact with the concentrated product can cause skin damage, including erythema, oedema, and ulceration. Penetration is faster through injured or damaged skin."[51] Most spray operators are

likely to have damaged skin, at least occasionally, because of the general working conditions.

Suicide concerns

Accidental or deliberate ingestion of paraquat "has been responsible for a large number of pesticide-related deaths. It is a major suicide agent in many developing countries".[52] In Sri Lanka, a 1989 study of 669 poison incidents indicated that agrochemicals were responsible for 59 per cent and that paraquat was the most common poisoning agent, with a fatality rate of 68 per cent.[53] From 1986 to 1990 in Malaysia, 1,156 committed suicide by drinking pesticides, mainly paraquat.[54]

> "a major suicide agent in many developing countries"

In the late 1980s the manufacturers added a blue pigment, a stenching compound, and also an emetic to many formulations of paraquat to help avoid severe unintentional poisonings due to oral intake. In response to a report on the high frequency of suicidal paraquat poisonings in Trinidad,[55] the manufacturer claimed that paraquat suicides are decreasing, and that safe use practices and training have decreased if not eliminated unintentional poisonings.[56] Recent data from developing countries, however, do not sustain this claim and, on the contrary, an increase of paraquat suicides has been documented in Costa Rica.[57]

In Samoa, the government has taken action to curb the number of suicides from paraquat. Between 1972 and 2001 over 360 people died after exposure to paraquat, in almost all cases as a result of deliberate ingestion. The population of Samoa is 167,000, and around 5000 farmers use herbicides. The formulation sold in the country contains the blue dye, emetic and stenching agents to discourage those intent on suicide, and the death rate reduced when these were introduced, but cases continued and numbers are beginning to rise again. [58]

Environmental issues

Paraquat has been ranked as 'very persistent' in soils by a Cornell University environmental risk index.[59]

"Paraquat is highly persistent in the soil environment, with reported field half-lives of greater than 1000 days … The reported half-life in one study ranged from 16 months (aerobic laboratory conditions) to 13 years (field study). Paraquat is slightly to moderately toxic to many species of aquatic life, including rainbow trout, bluegill, and channel catfish … In one study, 4 days after paraquat was applied as an aquatic herbicide, weeds sampled showed significant residue levels … small amounts of residues were found in potatoes treated with paraquat as a desiccant, and boiling the potatoes did not reduce the residue".[60]

Paraquat is labelled as a potential groundwater contaminant by the California Department of Pesticide Regulation on the basis that it has potential to move into groundwater based on water solubility, ability to bind to soils and long half-life.[61]

The German federal biological institute (BBA) refused re-registration of products containing paraquat based on its potential to accumulate in the soil, which could lead to the build up of harmful levels after a period of years. ICI (forerunner of Zeneca) challenged the ruling in the courts. Although the courts subsequently allowed a new formulation to be registered, the product is restricted to use on field crops only once every four years. Wider registrations were refused by the Court as their effects on the environment could not be justified.[62]

The European Commission's Scientific Committee of Plants said in December 2001 that a more detailed appraisal "on the likely effects of paraquat on the rate of degradation of organic matter in soil" should be provided.[63] It expressed concern about the effects of paraquat on animal

welfare, especially on hares and birds. The committee concluded that "paraquat can be expected to cause lethal and sub-lethal effects for hares and this is confirmed by field reports". On the effect of paraquat on birds, it said that the possible effects on the reproduction from spray solutions reaching eggs in nests and resulting in reduced hatching and serious abnormalities "could be of serious concern".[64]

Problems on plantations

Paraquat is sprayed extensively on plantations of crops grown chiefly for export, such as bananas, cocoa, coffee, cotton, palm oil, pineapple, rubber and sugar cane. The spraying occurs with high frequency especially in conditions of humid weather and rapid plant growth.On banana plantations, for example up to every six to eight weeks. Plantation workers are therefore exposed to paraquat on a regular basis.

Studies carried out by or in collaboration with ICI (forerunner of Zeneca) concluded that paraquat is most unlikely to cause serious health problems under correct conditions of use, despite the fact that in several of these studies reported injuries in between 40-50 per cent of workers.[65]

Other researchers have concluded that spray operators were continuously at risk for high exposures that may lead to severe intoxication and injuries. Even on plantations where efforts had been made to reduce risks, dangerous situations and events of inadequate handling were registered.[66,67] On banana plantations, the body parts identified with highest exposure were hands, wrists, back, and scrotum. The exposure determinants included splashing during preparation of the spray solution and open transportation, deposition of spraying mist, contact with spray solution when filling knapsack, leaking of knapsack on back and groin, adjustment of spray equipment, and walking through the sprayed vegetation.

Use of protective clothing is supposed to considerably reduce dermal exposure, although few studies have evaluated the effectiveness of personal protection or other safety measures. The retention of pesticides by protective devices may even result in increased absorption.[68,69]

Problems for smallholder farmers

Crops such as coffee, cotton, rubber and palm oil are grown by smallholders as well as on plantations. Smallholders may also use paraquat. Because paraquat is now an old pesticide, it is relatively cheap, and farmers often find the cost acceptable where labour costs are relatively high. But the costs of using paraquat without risk are prohibitive. A study of small farmers in Kenya found that no protective clothing was worn when applying paraquat, since the cost of rubber gloves were too high.[70]

Small farmers face some of the same problems as estate workers – such as lack of training, washing and medical facilities. Surveys carried out by the agrochemical industry in

> "paraquat can be expected to cause lethal and sub-lethal effects for hares"

Malaysia in 1987 showed that most of the estimated 715,000 rubber and oil palm smallholder farmers in the country used paraquat. Over a 10-year period to 1995 paraquat contributed to nearly 700 poisoning cases in Malaysia, of which 27 per cent were accidental and occupational exposures and the remainder were suicides.[71]

In Western Samoa, commercial slogans like 'Paraquat for healthier crops' have encouraged people to feel that spraying alone will ensure better crops. "Many people have been conditioned to accept spraying, planting and harvesting as the only essential agricultural activities".[72] These kinds of slogans can violate the FAO Code, which says that pesticides should not be advertised in a way that implies safety and environmental benefits.

Countries taking action to ban or restrict paraquat

Industrialised countries

Under the 1998 Rotterdam Convention on Prior Informed Consent (PIC), an early warning system on hazardous pesticides, governments are asked to notify control actions taken on pesticides. While paraquat is not included in the PIC procedure, six governments of industrialised countries have notified the Secretariat of bans and restrictions:[73]

Austria: all uses banned from 1 January 1993.
Denmark: all use prohibited from 1 July 1995.
Finland: use and import banned. Effective 30 August 1986.
Hungary: severely restricted. No remaining uses currently allowed. Effective 30 September 1991.
Slovenia: banned for use in agriculture. Effective 13 June 1997.
Sweden: banned. No remaining uses allowed. Effective 31 December 1983.

The basis of bans are primarily acute toxicity, absence of antidote, health and environmental concerns. In other countries strict guidelines are applied. For example the US Environmental Protection Agency allows its purchase and use solely by certified applicators.[74] In Switzerland paraquat is not registered for use. In Norway, the government decided in 1993 not to accept an application for the renewed registration of a paraquat product, Preeglone, due to its toxicity. But Zeneca, the producer, successfully appealed against the decision, claiming that for practical use, there is sufficient safety margin. Nevertheless the company stopped producing the formula in 1997 and it has since not been sold in Norway.[75]

The German ban arose from concern over its persistence in soil. Products containing paraquat were de-registered by Germany's federal biological institute in 1983, although only new products were affected. Following legal action by ICI (forerunner of Zeneca), the Braunschweig (Lower Saxony) administrative court ruled, in 1992, that registration must again be granted for the product. But the new paraquat formulation contains only 10 per cent of the active ingredient whereas the earlier formulation contained 20 per cent.[76] Elsewhere, German pesticide regulation laws relating to bee protection were tightened and spray equipment checks made compulsory.

The Swedish regulatory authority, KEMI, is highly concerned that changes in pesticide registration procedures in the European Union will force it to take paraquat back onto the market. It does not believe that paraquat is a suitable product to use in the country.[77]

Developing countries

The following developing countries have notified bans or severe restrictions to the PIC Secretariat:[78]

Indonesia: severely restricted to use under professional supervision and on large estates. Effective 1 February 1990.
Korea (Republic): restricted. Special labelling and all formulations to contain emetic, stenching agent and distinguishing colour. 30 March 1987.
Kuwait: banned. No remaining uses allowed. 1 January 1985.
Togo: restricted to contain emetic, colorant and stenching agent. Effective 1 January 1991.

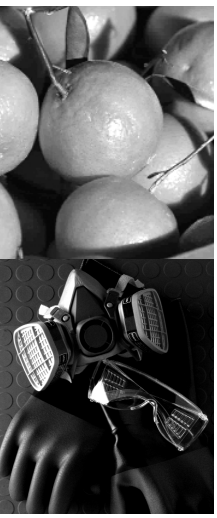
Other countries have taken action but not made a notification under PIC. Paraquat is restricted in Chile, which prohibited aerial applications in April 2001. In some Central American countries it is not registered for aerial applications. In September 2000, the Central American Ministers of Health signed an agreement on restricting the most toxic pesticides, including paraquat.[79] The agreement has not yet been implemented. Samoa has given notice of impending restrictions (see box), but illustrates the difficulties facing governments when farming systems are dependent on a specific pesticide, and no alternatives have been developed.

Restrictions in Samoa

Concerns with suicides prompted an NGO Symposium report to the Prime Minister to propose a phase out of paraquat over three years (see above). The Minister of Health expressed the need to protect the population and ban paraquat. However paraquat is almost universally used in the country in the production of taro, the staple food crop which is also exported to the Samoan diaspora.

The Pesticides Technical Committee of the Ministry of Agriculture, Forests, Fisheries and Meteorology has now issued new guidelines to restrict paraquat. It pointed to the complicating factors: "increased interest in the restricted use of paraquat, the misusing of paraquat as a suicide agent, the high value placed on pesticides by farmers who rely on agriculture for their livelihood, the public interest of safety to individuals and to the environment from the usage of paraquat".

Nevertheless, the guidelines restrict sales of paraquat and introduce risk reduction strategies. Those who buy or sell paraquat must be licensed/certified to do so, and training "shall be conducted for buyers/users of paraquat to ensure that proper use and protective measures are taken during the use of and, storage of the paraquat after use". The new guidelines were implemented with effect from 1 March 2002.[80]



3. Case studies

Malaysia – women workers at risk[81]

Agrochemicals are widely employed in Malaysia, especially on the plantations. Herbicides account for three-quarters of pesticides used and are sprayed on 4 million hectares of plantation crops namely palm oil, rubber and cocoa. Paraquat is one of the most frequently used herbicides.

The market for pesticides in Malaysia rose from RM 262 million ($70 million approximately) in 1993 to RM 326 million in 1997 ($86 million approximately). The aerial spraying of pesticides is still permitted by the Pesticides Board though only as a last resort. Several local companies are diversifying into agribusiness and Malaysia is becoming a focal point for pesticide exports in the Asia region. The country's Third National Agricultural Policy (1998-2010) states that rapid growth of the oil palm industry will be sustained. Rubber is also seen as a significant export earner.

Government figures found that most cases of poisonings between 1979 and 1986 were related to pesticides, mainly to paraquat. Geographical areas with plantations are likely to record higher levels of mortality due to pesticide poisoning. Data suggests that farm and plantation workers constitute 45 per cent of reported pesticide deaths.

Most sprayers on the plantations are women. Herbicide applicators on plantations average 262 spraying days a year; a woman sprayer carries an average of a four-gallon load on her back. It appears to be common practice not to disclose the names of the pesticides to the sprayers; on some occasions the labels from containers are removed before they reach them. Where the sprayers were able to identify the compound, they reported that the one most frequently used was paraquat, (followed by metsulfuron, glyphosate, 2,4-D and glufosinate ammonium).

A 1996 study by the Consumers Association of Penang found that 90 per cent of farmers surveyed did not observe safety measures while handling pesticide. Most plantation workers did not use protective clothing as they find it too uncomfortable in hot weather.[82] Boots, which are commonly worn because of dense undergrowth and snakes, are used to tuck in trousers and thereby catch pesticide drips.

At a meeting of government officials, industry, NGOs (Pesticide Action Network Asia Pacific [PAN AP] and the Consumers Association of Penang) and farmer associations, in November 2001, a representative from Syngenta Malaysia said that paraquat has been used without problems for the last 20 years in Malaysia. He said if there are problems, these have related to deliberate consumption for suicide and noted that the company had received information that paraquat causes no, or very minimal, soil degradation. This was refuted by PAN AP, who said that paraquat posed health problems for plantation workers.

The publication by Tenaganita and PAN AP on which this case study is based says that the Malaysian government's "seeming lack of urgency in reducing the amount of pesticides used in the plantations is a cause for concern, especially with regards to the safety and well-being of women workers, particularly those employed as pesticide sprayers and applica-

tors". It continues: "Poisoning due to paraquat is clearly demonstrated in the surveys and interviews with workers and indicated in the medical examinations. Paraquat use is rampant in the plantation sector … because of its effects to workers and users of paraquat, Malaysia has already restricted its use and classified it as Class 1 pesticide. However, more needs to be undertaken, given the extent of poisoning … it is urgently required that Malaysia bans paraquat."

Tenaganita and PAN AP recommend that: a systematic pesticide use reduction policy is needed. "Pesticides should be replaced with long-term, safe and ecological solutions to pest management."

Indonesia[83]

The trade union representing agricultural workers in Indonesia is extremely concerned about the conditions of pesticide sprayers on plantations, and in March 2002 carried out interviews with workers on three typical palm oil estates in Mata Pao and North Sumatra.

As in Malaysia, women often form the majority of the sprayers. The number of pesticide sprayers in each plantation depends on its size: in the Mata Pao plantation, 42 sprayers were employed, of whom 30 were women.

Paraquat is sprayed approximately once every two days, and the product used is manufactured by PT. Zeneca Agri Products Indonesia. The containers are labelled in English and Indonesian, but most sprayers cannot read.

According to the sprayers, they frequently experience symptoms: blurred vision, difficulty in breathing, skin damage and diarrhoea. They link all these symptoms to exposure to paraquat.

None of the sprayers had received any kind of training on pesticide spraying techniques. The plantation management does not monitor health and safety, nor implement measures to protect the sprayers. The management does provide masks, but these are difficult to wear and impede breathing. The clothing worn during spraying are very hot and was described by the sprayers as being 'absorbent to the skin', possibly meaning that it sticks to the skin, and thus increases skin contact when soaked with pesticides.

The workers are not clear who owns the plantations. The one in North Sumatra is a local company, and owners of the other two are based outside the district, and could be either foreign or Indonesian.

South Africa – lung capacity reduced[84]

A study of 126 workers on fruit farms in the Western Cape area of South Africa used a new test for measuring respiratory effects on the lungs of workers with long-term exposure to paraquat.

The study eliminated confounding factors such as smoking history, alcohol consumption, age, weight and height. It found that the lung capacity of workers exposed to paraquat was consistently 10–15 per cent lower than a reference population as demonstrated by decreased arterial oxygen uptake during exercise.

Of the workers studied, over half had been exposed to paraquat and the vast majority (83.5 per cent) were current applicators. The effects were apparent, even though none of the workers reported that they had been poisoned by paraquat, and only four had a history of skin burns (back, hands or other) from paraquat use. "The main finding is a small but significant effect", says the study.

Costa Rica – decreased use helps health

Bananas are one of Costa Rica's most important agricultural exports and pesticide use and poisonings on plantations are high. Until the 1960s bananas were grown worldwide with relatively few agrochemicals. Today, bananas rival cotton and rice as the biggest consumer of agrochemicals. Banana plantations in developing countries use, on average, up to 20 times more pesticides per hectare than applied in agriculture in industrialised countries. Many of the chemicals used are highly toxic, and the toll

on the health of plantation workers and their communities is severe.

In Costa Rica, in 1996, 45 kg of active ingredients were applied on each hectare of banana cultivation, equivalent to 65 kg per banana worker.[85] Over 60 per cent of reported pesticide poisonings in the country are from banana plantation workers.[86]

> “A decrease in the use of paraquat appears to have brought the biggest improvement.”

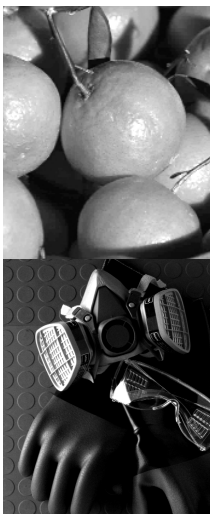
Paraquat is one of the main pesticides used on the plantations. Over a quarter of the poisoning incidents reported between 1995 and 1997 involved paraquat; fourteen of these incidents involved workers under 18 years old, whom the law says should not be handling these pesticides.[87]

A Ministry of Health intervention programme in the early 1990s helped to decrease poisonings on banana plantations. The programme brought about significant improvements in safety measures. Nematode applicators were provided with full protective equipment, they are not permitted to eat or smoke while working, spray for only a limited period and rotate with other workers. Medical services were also made available. These measures were not extended, however, to herbicide and fungicide spraying and injuries related to these pesticides did not decline.[88]

A decrease in the use of paraquat appears to have brought the biggest improvement. Between 1993 and 1996 a decrease of 40 per cent in paraquat injuries was observed. According to Wesseling, professor at the Instituto Regional de Estudios en Sustancias Toxicas (IRET) in Costa Rica: “the obvious reason is that less paraquat was used in 1996 than in 1993. However, under-reporting of milder cases of paraquat injuries was suspected. In both years, paraquat was the pesticide most frequently associated with injuries, mostly skin and eye lesions. Of herbicide-related illnesses in 1996, for which compounds were specified, 71 per cent concerned paraquat”. Pressure from community organisations and the “requirements of international norms of product quality certification” lay behind the fall in paraquat’s use.[89]

In June 2000, a coalition of non-governmental organisations, including Foro Emaús, and trade unions in Costa Rica, Germany and France launched a national and international campaign to ban the use of paraquat on banana plantations in the Latin American region.

The campaign has included press articles, letters to key politicians and importers and popular education. Campaigners report that there has been a reduction in imports of paraquat to Costa Rica.



4. Can agriculture manage without paraquat?

Alternative approaches

At first sight, herbicide use seems to be justified economically when compared to hand weeding. In transplanted rice, for example, one study shows that the benefit-cost ratio of controlling weeds is 16:1 for herbicides and 3.3:1 for hand weeding.[90] In a Ghana study, maize plots treated with glyphosate yielded 45 per cent more in farmers' fields than hand weeding, 151 per cent more on test plots.[91] A study of maize-based systems in the Embu district of Kenya found that benefits to farmers increased by 61 per cent when herbicide was used in a maize/bean intercrop system and 46 per cent in maize monocrop.[92]

The studies have important limitations: they assume that farmers have the money to buy herbicides. This may not be the case. The cost of borrowing could be high enough to sharply reduce the economic benefits. The economic costs of sickness caused by the use of herbicides, or environmental impact are not taken into account, nor is the impact on hand weeders who lose their job because a farmer switches to chemicals.

The primary limitation, however, is that the comparison is made with farmers who are not using alternative weed control strategies. Many other options are open. The alternatives are far wider than hand or chemical weeding. The introduction of integrated weed management is the most important alternative to paraquat. This involves the use of natural enemies of weeds and uses a combination of techniques, which may include some herbicide and hand weeding. The techniques are being used with success in a number of developing countries.

"Techniques include crop rotation, cover cropping, intercropping – growing two or more crops in the same area – adjusting the timing or density of planting, manipulating soil temperature and moisture, planting weed-suppressive varieties, mulching, tilling … and allelopathy (natural release by certain plants of chemicals which inhibit growth of plant species)"[93]

Mulching makes use of cut grass or straw placed on the ground, usually around the base of the plant's stem. The approach is widely used in smallholder agriculture, but is also proving beneficial in plantations. One study has found that oil palms on plantations in Costa Rica, that are growing with legume ground covers, "usually show better growth, nutrition, and yield than monocropped palms".[94]

Sustainable non-chemical weed control is generally more complex than spraying herbicides. "It demands recognition that weeds are part of a complex agrosystem and may have beneficial properties, and that the goal of weed management is a healthy, productive system – not necessarily weed eradication".[95]

If farmers use a system that stifles weeds then herbicides may be unnecessary. Continuous, all the year round, vegetation helps; soil is then covered virtually throughout the year. In these systems, leguminous forage crops are often rotated with mainstream crops. The forage crops add nitrogen to the soil and serve as a green manure.

Incorporating legume crops into this type of system "has reduced weeds significantly".[96]

These systems also reduce erosion and conserve moisture. The use of green manures in a project in the Brazilian state of Santa Catarina is recorded as "eliminating the need for most weeding".[97] Small farmer agriculture has shown that it can manage without paraquat, and even without herbicides, but the use of alternatives on plantations appears more difficult.

While less toxic herbicides than paraquat may be an option, many pesticides can cause problems under conditions of use both in developing and developed countries, and where possible alternatives need to be encouraged.

Conservation agriculture

The technique known as 'conservation agriculture' may be suitable for plantations and estates. This is being promoted by, among others, the UN Food and Agriculture Organisation. Instead of farmers burning crop residues after the harvest, or ploughing biomass into the ground, they leave them in place, as soil cover. At the start of the next cropping season, fields are not ploughed. Seeds are instead drilled with a special 'zero tillage planter' directly into the soil.

"Besides reducing mineralization, erosion and water loss, the surface cover inhibits the germination of weeds, protects soil microorganisms and helps build up organic matter. Result: less time and labour spent on land preparation, lower fuel consumption and less air pollution, reduced need for chemical inputs, and increasing yields and farm income", says the FAO. [98]

Conservation agriculture (CA) requires careful planning of crop rotations and new approaches to weed control and pest management. But CA is being adopted from the humid tropics to northerly temperate zone countries. Recent studies estimate that the system is practised on about 58 million hectares of farm land, mainly in North and South America, and also in Southern Africa and South Asia.

Conservation agriculture (also known as zero tillage or no tillage) is generally a 'win-win' situation, says the FAO, although herbicides are seen as "an important component in CA, particularly in the transition phase until a new balance in the weed population is achieved … In general, CA farmers use fewer chemical inputs than comparable conventional farmers and, over the years, quantities of chemical inputs tend to decline … once the CA environment has stabilised, it tends to be more manageable and productive than conventional agriculture."[99]

CA is not organic agriculture although the two could be combined; rather it works on the same principles as integrated pest management. "Like IPM, it enhances biological processes, and expands IPM practices from crop and pest management to overall land husbandry".[100]

Monocropping is the norm in plantations where under zero-tillage is possible, says the FAO, although they do not recommend it because it is "just as in conventional farming and it creates pest problems."[101] But as the pest problems are created anyway, the adoption of zero tillage offers advantages, not least in terms of reduced herbicide applications.

Cuba

Prior to 1989, Cuba's agriculture had one of the most mechanised agricultural sectors in Latin America. The vast majority of its agricultural inputs were imported. When the Soviet Union dissolved in 1989 the entire system of food security in Cuba collapsed. The United States then passed a bill which tightened the already stringent blockade against Cuba, exacerbating the food crisis. The country was faced with economic isolation, cut off from 80 per cent of its trade.

Cuba was forced to make rapid and dramatic changes to its entire system of food production and distribution in order to avoid widespread malnutrition. It had to produce more food with less inputs. The most significant aspect was the removal of the chemical crutch, as imports of fertiliser, pesticides and herbicides dried up.

The country's scientists developed alternatives to chemical dependency, including a biological pest-control programme. As a result of

such necessary innovations, the Cuban landscape, once dominated by chemical inputs, has changed rapidly. Many of the new control methods are proving more effective than pesticides in increasing crop yields. One farm, where maize has doubled "in both yields and size of the cob over one year", appears typical of many.[102]

"Crop rotations, green manuring, intercropping and soil conservation are all common today. Planners have also sought to encourage urbanites to move to the countryside … Conventional wisdom has it that a switch away from chemically-intensive agriculture will ultimately lead to a fall in yields – though this is not necessarily the case. In Cuba, the intensive State sector, controlling the vast majority of the land, suffered a fall in yields, but small-scale farmers were able in some instances to increase their productivity. In many cases, peasant farmers had remembered old methods and reapplied them".[103] Cuba's experience shows that agriculture can thrive without herbicides.

Alternative strategies in cropping systems that use paraquat

Cotton

A programme to encourage the elimination in pesticide use on cotton is being implemented by FAO. According to the FAO, safe use of pesticides on cotton is 'practically impossible' in the South "… farmers will finally learn that an unsprayed cotton field is not necessarily devastated by pest outbreaks".[104]

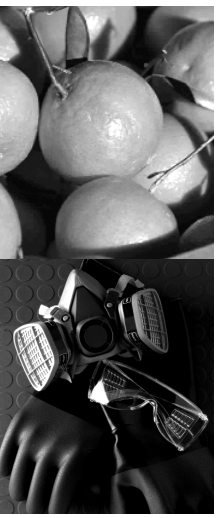
Farmers from Australia, Benin, China, India, Peru, Pakistan, Uganda and Zimbabwe are already using their understanding of agroecology and natural control methods to greatly reduce and sometimes eliminate their use of pesticide on cotton.[105]

There are, for example, traditional techniques for controlling weeds which are present in the soil where cotton is being grown. The technique of hoeing loosens the surface of the soil and also "eradicates weeds and limited surface evaporation".[106] There is a need for further research on keeping cotton weed-free without the use of chemicals.

Coffee

Farmers in Ethiopia, where coffee originated, are showing that herbicides are not necessary to control weeds. Coffee in Ethiopia is overwhelmingly a smallholder crop; about 95 per cent is grown without the use of chemicals. Weeds, insect pests and crop diseases are controlled by traditional farming practices, including intercropping and the use of mulches; these are prominent around coffee trees.[107]

On established coffee, and also tea estates, chemical-free management of weeds can be done with leguminous or other cover crops, occasional hand weeding and animal mulches. Growing under shade trees helps to suppress weeds.[108]



5. Corporate approaches

Warning or promoting?

"Wash with soap and water after use … if symptoms persist, consult a doctor immediately".[109] Instructions like this are common for pesticide operators in developing countries. But they are totally unrealistic. Running water, showers and soap are often a rare commodity in many rural locations while doctors are even rarer.

> "Wash with soap and water after use … if symptoms persist, consult a doctor immediately."

In 1991 'The Global Safe Use Project' was launched by the pesticide industry to train pesticide operators in developing countries. Safe use projects (SUPs) are designed to provide training for large groups of users, and those who influence how pesticides are used, including medical personnel, agricultural technicians and teachers. The industry cites SUPs as a prime example of how the pesticide industry is taking its commitment to sustainable development seriously "by ensuring a central but sustainable role for chemical pesticides in the production of world food crops and commodities".[110]

In Guatemala, the first phase of a project trained 800 government agents, who went on to train "a further 226,000 farmers and housewives, 2,800 teachers, and 67,000 schoolchildren, 700 pesticide distributor employees, 330 technical and sales people and 2000 physicians and health personnel".[111]

Industry claims that the programme is a success, with a significant decline in reported pesticide poisonings. But under-reporting is chronic in Central America, and exacerbated in Guatemala by the effects of civil war and the drastic decline in public sector activities. The figures quoted by industry do not make clear whether they refer to persons reached with pesticide-related information, or the successes of training. Another problem with the Safe Use programme in Guatemala is the assumption that pesticide problems are linked to poor use practice, rather than the intrinsic properties of the chemicals. Farmers may know the dangers, but their ability to take action is defeated by practical constraints of poverty or other pressures. Critics point out that the main message of Safe Use programmes is "use pesticides safely, but by all means use pesticides", rather than one that recognises that many of the pesticides currently in use may need to be eliminated.[112]

Chemical companies also run their own programmes. Under a farmer-training programme Ciba-Geigy trained farmers in ten developing countries in integrated pest management and applicator safety. A former leader of the programme says that the programme had successes in Dominican Republic and Pakistan. In 1998 Zeneca had safe use projects in India and Pakistan. These arose "because of the crisis situation in cotton where there were very poor crop management practices". The company figures showed that pesticide use after training dropped by 20–30 per cent, yields increased by 25 per cent. Profitability for farmers increased by 33–65 per cent.[113]

China: Pesticide use 'atrocious'

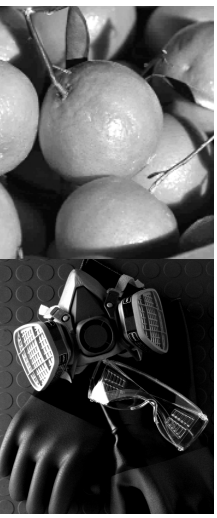
Syngenta has a new paraquat factory in Nantong, Jiangsu province, and describes China as "a major growth opportunity". The Annual Report 2001 says: "with an estimated 800 million rural Chinese living on farms of less than half a hectare and more than 2,000 crop protection retailers, the challenge of distributing, marketing and communicating to this customer population is considerable. Through successful segmentation, supported by a significant investment in domestic manufacture, Syngenta has taken leadership in this complex market and sustained strong growth in 2001".

Yet pesticide use in China "is in general atrocious", says Dr. Kong Luen Heong an entomologist with the International Rice Research Institute (IRRI) in Manila; "pesticides sales are promoted by extension (services) everywhere in China. This and the low prices are part of the reason why China's pesticide use is easily five times more than countries like Thailand or Vietnam, which in my opinion is already high. There seems little control over how pesticides are used, stored or sold. Paraquat is a deep concern."

"At a conference last year, we initiated an environmental attitude in some stakeholders and we have now taken this further. In Jinhua county (200,000 households) we are cooperating with the vice mayor to evaluate a 50 per cent reduction in insecticide use for rice pests over several villages using a farmer participatory approach. The aim is to collect sufficient evidence from large scale experiments on pesticide reduction in order to initiate change at the policy level. We did this in Vietnam and stimulated the government to stop registering some insecticides". This project, called the "Jinhua Initiative for cleaner and greener agriculture" will be launched by the Jinhua County on World Environment Dat 2002 June 5.

"Safe use of paraquat cannot be guaranteed in China. The company cannot build its future on an old dirty product – that is the wrong way for the company, for investors and for clients", said Francois Meienberg

Sources: Syngenta Annual Report, 2001 Communication: Dr Heong, IRRI, and Francois Meienberg, Berne Declaration, and Meienberg to author.



6. Recommendations

Syngenta's Annual Report 2001 and Annual Review 2000 do not mention paraquat by name. This might suggest that the company would prefer the world not to know about its association with paraquat. This is hardly surprising, as paraquat has become a dirty word for one of the world's most controversial pesticides.

Syngenta is tainted by its association with paraquat. The pesticides a company promotes are a reflection of its character. As a responsible company, Syngenta should show leadership in phasing out production, sales and promotion of paraquat products.

Health and environmental problems arising from pesticides are global, but the conditions of pesticide use in developing countries can make it virtually impossible to use acutely toxic pesticides without harm to human health and the environment. The women and men who apply pesticides, either as small-scale farmers or agricultural workers, are particularly vulnerable. Paraquat is an acutely toxic pesticide that has consistently caused concern when used under conditions of poverty. New evidence of hazards in the field in developing countries and scientific evidence indicates the need for urgent action.

The Berne Declaration, Foro Emaús, Pesticide Action Network Asia Pacific, Pesticide Action Network UK and the Swedish Society for Nature Conservation are launching this report to draw attention to these global concerns:

Bearing in mind that pesticide hazards cannot be avoided even in industrialised countries with infinitely more human, financial and technical resources, and that hazardous pesticides are promoted under conditions where users lack:

- training and good literacy skills;
- ability to apply complex label instructions;
- appropriate and affordable personal protective equipment;
- access to running water to shower after spraying and wash clothes;
- easy access to medical treatment;
- good quality and well maintained spray equipment and
- suitable storage facilities and the means to dispose of containers.

Noting the inherent toxicity of paraquat and lack of antidote which makes it impossible to prevent severe health effects;

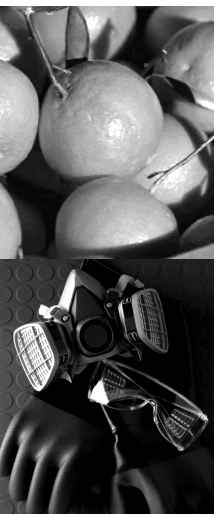
Recognising that governments, particularly in developing countries lack the capacity to regulate pesticides and restrict the availability of the more hazardous pesticide formulations;

Recalling that the FAO Code requests industry to "halt sale and recall products when handling or use pose an unacceptable risk under any use directions or restrictions" (5.2.4);

Considering the importance of sustainable agriculture for health and the environment as supported by Syngenta in its launch of the Foundation for Sustainable Agriculture in October 2001;

Demands that Syngenta demonstrates its commitment to corporate responsibility, to promoting sustainable agriculture, and to implementing the undertakings of FAO Code by acting on the following recommendations:

1. Within three years, and starting immediately, phase out the promotion and sale of paraquat products in developing countries.
2. Cooperate with national initiatives to ban paraquat taken on the basis of health or environmental concerns, and support the inclusion of paraquat under the Rotterdam Convention on Prior Informed Consent to alert governments to concerns under adverse conditions of use.
3. Ensure that governments and users are alerted to the acute toxicity of paraquat and the lack of an antidote by collaborating with the WHO to place paraquat in its 'extremely' or 'highly' hazardous classification (rather than the present 'moderately hazardous' classification). This is consistent with the 'highly hazardous' classification of the US Environmental Protection Agency.
4. While sales remain in developing countries: implement a system of returnable and refillable containers; and ensure that formulations are sold only with the addition of the dye, stenching agent and emetic, where the limited safeguard of Fuller's Earth can be guaranteed to be immediately available and where all users have ready access to affordable independent medical facilities.
5. Allocate greatly increased resources to develop agricultural products that contribute to ecological, sustainable agricultural production, and phase out the production of paraquat and other hazardous pesticides.



Footnotes

1 Novartis was itself a merger of Ciba Geigy and Sandoz, and AstraZeneca a merger of Astra and Zeneca, which had formerly been ICI.

2 Annual Report, 2001, page 7.

3 Syngenta website, www.syngenta.com

4 Syngenta spokesperson to author, March 2002.

5 Annual Review, 2000, page 21.

6 Syngenta website, op. cit.

7 Barbara Dinham to author, March 2002.

8 Figures from Syngenta Annual Report, 2001. The company's regional breakdown makes sales to developing countries difficult to ascertain. They could be estimated at about a quarter to a third.

9 Annual Report 2001, page 12.

10 Annual Report, 2001, page 39

11 ILO, 'Chemicals in the Working Environment', in World Labour Report, 1994, Geneva, 1994.

12 ILO, Wage workers in agriculture: Conditions of employment and work, Sectoral Activities Programme, Geneva, 1996.

13 'Risky pesticides on sale in Africa', Pesticides News 51, March 2001.

14 Perry, M.J., Marbella, A., Layde, P.M. Compliance with required pesticide-specific protective equipment use. American Journal of Industrial Medicine 2002, 41:70-73.

15 Dinham, B., 'Corporate change', Pesticides News, 53, September 2001.

16 'Crops and Robbers', Action Aid, October 2001.

17 Public Health Impact of Pesticides Used in Agriculture, WHO in collaboration with UN Environment Programme, WHO, Geneva, 1990.

18 World Health Organisation website, www.who.org.

19 Corriols M, et al. Incidencia de intoxicaciones agudas por plaguicidas y estimación del subregistro en Nicaragua. Serie Investigaciones # 6. Nicaragua, Managua: Proyecto Plagsalud (OPS-OMS/DANIDA), 2002).

20 Dinham, B., 'The Pesticide Hazard', Zed Books, 1993, p. 39.

21 Figures calculated from List of Lists, PAN UK, London, September 2001.

22 Eddleston, M., 'Patterns and problems of deliberate self-poisoning in the developing world', Original papers, QJ Med, 2000, 93: 715–731.

23 Ibid.

24 Dinham, 1993, op. cit., p. 64.

25 Chlorpyrifos pollution kills fish, Pesticides News 53, September 2001.

26 Beaumont, P. 'Keeping pesticides out of water', Pesticides News 51, March 2001.

27 'Prevention and disposal of obsolete and unwanted pesticide stocks in Africa and the Near East', Rome: FAO, 1996, quoted in Madeley, J., 'Big Business, Poor Peoples', Zed Books, 1999, p. 45.

28 Bage, Lennart, speech to the Governing Council of the UN International Fund for Agricultural Development, Rome, February 2002.

29 FAO website: www.fao.org

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