Global Pesticide Campaigner

March 1994 Volume 4, Number 1

Facing Down Pesticide Risk Assessment

by Mary O'Brien

Most pesticide risk assessments are used to "scientifically" justify exposing humans and other animals to toxic pesticides against their will or without their consent. While the U.S. has helped lead the way in developing pesticide risk assessments, free trade agreements are now drawing the entire world into the risk assessment system to justify and increase worldwide trade in pesticides and other toxics. It is time for the worldwide pesticide reform community to put assessment of alternatives to pesticides on the throne currently held by assessment of pesticide "safety" and "acceptable harm."

Consider the following analogy: An adult comes upon two children, one of whom is hitting the other repeatedly. The adult stands by, trying to determine how much the one child can hit the other without bruising the other child, or maybe causing kidney damage. The adult does not intervene to stop the fight or even require the first child to consider any alternatives to hitting the other child.

This scenario is similar to the way our societies use risk assessment (see box, page 12). While people (and companies) release, spray, and dump pesticides into other people's food, air, water and bodies, certain adults in positions of responsibility in our societies (or international bodies) stand by, going through the motions of estimating just how much pesticide pollution is safe or acceptable. Sometimes these adults will say, "You can pollute food (or air or water) with this much pesticide, and it will be safe." Other times, the adults will say, "You can pollute food (or air or water) with this much, and it won't be entirely safe, but the harm will be acceptable." But these adults do not require the pesticide polluter to consider or implement alternatives to using the pesticides.

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Risk Assessment Goes International: A New Role for Trade Agreements

by Mary E. Kelly

Remember saccharine? An artificial sweetener with a wide variety of uses, saccharine was removed from many products in the U.S. in the early 1980s after widespread concern arose over its potential to cause cancer. Now U.S. products which still contain saccharine must have a clear label informing consumers of the cancer risk. Some might point to saccharine as an example of how the U.S. food safety regulatory system works to protect public health. But there is another side to the saccharine story, one that illustrates the dangers of over-reliance on the burgeoning "science," or, as some might say, the "art" of risk assessment.

As concern about the health effects of saccharine began to surface, various risk assessments were conducted in an attempt to determine the level of danger posed by the popular sweetener. Depending on which of three accepted mathematical models government risk assessors chose to use, they predicted either 5 or 450 or 1,200 additional cancers per million people from saccharine ingestion. Complicating the picture even further, an industry-sponsored risk assessment predicted only one cancer per *billion* exposures.[1] Thus, the highest predicted risk (1,200 out of a million) was more than one million times greater than the risk predicted by the industry study.

The saccharine studies reflect at least one of the inherent problems with risk assessment: scientific uncertainty of which dose-response model to use in trying to predict what level of food additive, pesticide or other food contaminant is "safe."[2] There are many other well-documented problems with using risk assessment to evaluate what level of contamination is "safe" or legal under U.S. food

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PAN is an international coalition of citizens' groups and individuals who advocate adoption of ecologically sound practices in place of pesticide use. Established in 1982, PAN currently links over 300 organizations in some 60 countries, coordinated by six Regional Centers. Because PAN is a network, no individual can direct or represent the entire coalition. Participants are free to pursue their own projects to further PAN's objectives, and benefit from their access to the collective resources of the network.

Editor: Ellen Hickey

Contributing Writers: Gina Bearse, Barbara Dinham, Linda Elswick, Mary E. Kelly, Monica Moore, Mary O'Brien, Erica Rosenthal, Anne Schonfield, Paul Thiers, Lori Ann Thrupp, Carrie Wullen

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PAN NORTH AMERICA REGIONAL CENTER
110 New Montgomery St.#810
San Francisco, CA 94105 USA
Tel: (415) 541-9140
FAX: (415) 541-9253
Telex: 156283472 PANNA
E-mail: panna@igc.apc.org

The First Word

by Monica Moore

Historically, pest management policies in the United States and countries around the world have been based on the assumption that pesticides are indispensable to food and fiber production, public health and consumers' quality of life. Legal, financial and regulatory infrastructures reflecting this assumption have so colored our thinking that the world's pest management infrastructure now focuses almost exclusively on pesticides: controlling pesticide product quality and label standards, setting and harmonizing permissible residue levels, requiring that pesticide products be used as effectively as possible, minimizing damages to users, consumers and the environment, etc.

Underlying virtually every aspect of this infrastructure one finds pesticide risk assessments. How much of what pesticide causes how much of what kind of damage? How much worse or better is this pesticide than that pesticide? How much residue will be allowed? Proponents and practitioners of risk assessment are often amazed that their favored techniques have become the focus of growing controversy and do not understand why this should be so. Their assessments help to define what they consider to be scientifically defensible exposures to harmful compounds, and to establish priorities and allocate resources. Since no pesticide is risk free, they argue, shouldn't we rank the risks, then focus on addressing the most problematic?

Yet relying on risk assessment as the basis of pest management policy is increasingly recognized by sustainable agriculture and development advocates as fundamentally in conflict with ecological pest management. Pervasive use and abuse of these "tools of dispassionate inquiry" throughout the decision-making process both substitutes for and hinders the process of pest management policy formation. An inclusive public process for creating new and more ecologically-rational pest management policies grows ever more crucial as people around the globe struggle to correct the historical bias toward chemically-dependent agriculture embedded in current law and practice. Meanwhile, in the absence of clear goals and earmarked resources to develop more sustainable agricultural production systems and protect public health, risk assessments squander scarce time, attention and funds in an endless attempt to answer questions that in the broader context only lead us further in the wrong direction.

Close public scrutiny of risk assessment's role as an obstacle to sustainable pest management and democratic process is long overdue and urgently needed. In this issue, as a contribution to this essential debate, several activists knowledgeable about the techniques and consequences of risk assessment discuss both the problems of and alternatives to continued use of pesticide risk assessment in a variety of settings. Their insights into what is wrong and what can and must be done differently are creative and instructive. It is also interesting to note that following the transformation from chemical pesticide management to ecologically-based pest management, risk assessments might still have a (greatly diminished) role to play when they are no longer usurping the place of democratic processes and policies that support sustainable and equitable agriculture, trade and pest management.

Monica Moore is Program Director with the PAN North America Regional Center.

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This issue of the ***Global Pesticide Campaigner*** features a new, expanded 24 page format that will allow PAN to bring you even more news and information from around the world. As part of this new format, we are adding a regular feature to keep readers informed about ongoing PAN campaigns both in the United States and internationally. The first ***PAN Campaign Update*** focuses on our methyl bromide campaign (page 16). In addition, in response to readers' requests, we are including a list of frequently used abbreviations and acronyms (page 22).

Exporting Risk Analyses to Developing Countries

by Lori Ann Thrupp

In 1977, following the publication of unquestionable evidence that the toxic pesticide DBCP (1,2-dibromo-3 chloropropane) had caused permanent sterility of dozens of workers in a California formulating firm, the Environmental Protection Agency (EPA) undertook an investigation and a typical quantitative risk analysis of the product.

One of the EPA conclusions was that farmworkers applying DBCP have 1/1000 of the risk of sterility as workers in formulating plants. Based on this and other findings, in 1977 the EPA restricted the use of DBCP for use only in pineapples in the U.S., required changes on the product label to indicate a higher hazard level than previously, and recommended masks and protective clothing for workers in formulating plants and field workers. In 1986, the EPA banned the product for all uses in the U.S.

photo by Kai Siedenburg

Women spraying paraquat in Malaysia, 1991.

DBCP continued to be manufactured in the U.S., exported, and sold in developing countries,[1] especially for banana production in Central America. Many producers relied on the EPA risk assessment calculation of minimal risk of sterility to workers to justify their continued use of the product.

However, starting in late 1979, evidence began to emerge that hundreds of workers in Central American banana plantations had been made sterile from DBCP exposures. Through the 1980s and early 1990s, thousands more workers (from both fields and factories) in Mexico, Israel, Central America, the U.S., and other parts of the world have emerged as victims of DBCP. Hundreds of these workers have since filed and won law suits against the manufacturers.[2]

The DBCP case is just one among many examples illustrating the problems of relying on quantitative risk analysis to evaluate toxic agrochemicals internationally. Numerous other harms have occurred around the world when the public has been misled by risk analysis calculations.

Risk assessments presently used on pesticides are inherently unrealistic. By using controlled laboratory experiments and mathematical models far removed from reality, risk analyses ignore actual diverse field conditions, synergistic effects, the hazards of non-active ingredients (such as solvents, preservatives, and emulsifiers),[3] and complex environmental and social phenomena – all of which affect the outcomes of pesticide use. Risk assessment is not only abstract; it is often misleading for indicating actual risks of pesticides.

Relying on risk analysis computations by regulatory agencies in the U.S. or by pesticide firms is particularly inappropriate and even dangerous in developing countries, where pesticide use has increased rapidly in recent years. Here, the climatic and social conditions are particularly complex and distinct from temperate conditions, and do not match assumptions of risk analyses. Health damage and contamination from pesticides are pervasive in the South.[4] Most developing countries lack the political will and resources to devote attention to the hazards of pesticides, and are often pressured by pesticide firms to allow unfettered marketing.[5] Lacking alternative information sources, decision-makers commonly accept and incorporate risk analysis findings from the U.S. EPA, industry or international agencies when developing pesticide policies. These nations urgently need alternatives to and changes in risk analysis for forming policies and also need unbiased information on the benefits of non-chemical pest control alternatives.

Climatic Factors and Pesticide Kinetics in the Tropics

Standard pesticide risk analyses assume average temperatures and climatic conditions of temperate countries, which are very different from those in developing countries located in tropical regions. It is inappropriate for developing countries to accept and apply the hazard warnings and expiration dates that are established in the North.

The tropics are characterized by extremely high temperatures and often extreme humidity in agricultural areas. These climatic features also explain the richness and diversity in tropical flora and fauna, and distinct features of pests and diseases, as compared to those in the North.

When predicting the effects of pesticides in tropical conditions, the influences of high ambient temperatures and humidity have to be taken into account.[6] It is well known that "higher temperatures have a role in enhancing the release and transport of certain pesticide chemicals and other viable particulates."[7] The foliar uptake of pesticide aerosols and root uptake from soils are higher at higher temperatures than at lower temperatures. Higher temperatures affect toxicity (to plants and to people) through impaired heat regulation, water loss, circulatory disturbances, and basal metabolism changes.[8] Higher ambient temperatures affect toxicokinetics – toxic chemical reactions and flows in the environment. Toxicity

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often increases as temperatures rise, depending on the chemical nature of the toxin. Temperatures also affect stability and persistence of insecticides. For example, carbamates persist in cold water for longer periods than in warm water due to lower rates of degradation.[9]

Higher humidity influences the movement of pesticide particles in the environment and facilitates drift.[10] Many chemicals penetrate the skin more easily at higher temperatures. High ambient humidity causes swelling of the surface layer of the skin, which enhances the penetration of chemicals.[11]

Humidity affects the toxicity of some chemicals by forming more irritating products, such as nitric acid from NO_2 and HCl or Cl_2 from chlorinated organics. High humidity also speeds up corrosion and deterioration of metal containers, which leads to leaks and exacerbates dangers of storing chemicals over time. Exposure to prolonged solar radiation influences responses of some chemicals and reduces their longevity. Since chemicals used in the South are commonly exposed to intense sun as well as high temperatures, they often expire earlier than in temperate areas.

photo by Christopher Brady

Aerial spraying of fungicide in San Quintin, Baja California, Mexico, 1993.

Because of the extreme heat and humidity in many parts of the tropics, it is not only uncomfortable but essentially impossible for workers using pesticides to wear impermeable protective clothing and masks. If workers were to wear high-quality impermeable gear, they would collapse from heat stroke.[12] When workers try to wear lightweight protective gear, they usually perspire profusely and need to remove the gear while working to wipe sweat from their faces; this increases exposure and exacerbates health hazards.

Limited data are available on these complex interactions between climate, chemical toxicity, and risks in tropical conditions. Further epidemiological information and studies are needed; however, it is clear that this great diversity of conditions make the risks of pesticides higher and very different in the developing countries than in temperate countries of the North.

Conditions of Exposure and Occupational Health

Risk assessments for pesticides undertaken in the North base calculations on estimated exposure levels for adult bodies, usually based on "average" conditions of farmworkers and consumers. Policy-makers in the North and South often assume that these figures are applicable globally and blithely transfer them abroad. However, such assumptions are clearly fallacious: exposure levels in the South are usually much higher than in the rich countries.

Typically, growers in developing countries are unaware of the hazards of pesticides and of the need to use protective equipment. They lack this equipment largely because of the high cost and lack of access to resources. In poor rural areas, it is common to see workers and farmers wearing short pants and short-sleeved shirts while handling, mixing, and applying pesticides, and while working in fields during aerial spraying. Government agencies and pesticide firms seldom if ever provide sufficient information and precautions. As mentioned earlier, even if safety gear were available, it would be difficult or impossible to wear in hot humid climates.

Commonly, people use worn-out equipment, such as leaky sprayers and corroded nozzles. These increase worker exposure and compound hazards, as well as creating inefficiency, waste and economic losses. Work environments are almost invariably characterized by poor hygiene, lack of washing facilities, highly strenuous work, and unplanned shifts, so that rural workers lack recovery periods and measures for dealing with chemical stresses.

Storage facilities for pesticides tend to be inadequate in developing countries. Small farmers commonly store their products in unventilated small sheds or inside their homes, where all family members are openly exposed. In large-scale plantations, the warehouses or sheds used for storage usually are poorly ventilated and contain old products and leaky drums of chemicals, thereby creating hazards.

Both storage and application problems are aggravated by lack of access to pesticide use information. The labels on products often have incomplete or illegible information on hazards and toxicity, or are in a language foreign to the local people. In many situations, the people handling the chemicals are unable to read; alternative advising and training services are rarely available.

Rural communities are commonly exposed to toxic occupational pollutants in fields and in contaminated stream water in addition to pesticides. Developing countries often lack water treatment facilities as well. Thus, the exposure of people in the South to pesticide-polluted water is higher than it is under average conditions in the North. The synergistic effects of several chemicals provoke harmful impacts and health problems, about which little epidemiological data are available.

Nutritional Factors and Pesticide Toxicity

Risk assessment estimations are based on hazards and exposures for healthy male adults; they do not account for unhealthy or undernourished people or for children or women. Malnourishment and dietary deficiencies are pervasive in the South, especially among rural populations. Numerous studies show that people who are nutritionally deficient are more susceptible to poisoning and to chronic disorders from exposure

to pesticides than well-nourished people. Likewise, people with poor nutritional status suffer worse symptoms from poisonings and health problems and have more difficulty recovering from the effects, compared to average well-nourished people. For example, people with Kwashiokar, a protein-deficiency disease, suffer from worse health effects than normal healthy people when exposed to pesticides. Protein deficiencies can increase the risk of cancer for some chemicals as well.

Special Ecological Considerations in the Tropics

Finally, the fact that risk assessments are undertaken in controlled laboratory environments make them particularly inappropriate to use in pesticide use decisions in the South. The environmental conditions of the tropics are far from those in controlled sterile labs. Most tropical agroecosystems are characterized by distinct and complex ecological phenomena, which are partly due to the intense solar radiation and tropical climate discussed previously. Other prevalent features which affect the presence and risks of pesticides include rapid cycling of nutrients, fast breakdown and decay of biomass, rapid rates of vegetation growth, and intense tropical rainstorms (with high total levels of precipitation). Although these features cause pesticides to degrade more quickly than in temperate environments, they also tend to increase the rate of movement, cycling, drift, and dispersal of the chemicals, creating distinct kinds of hazards. For example, agrochemicals can move into tropical groundwater supplies more quickly and easily. Runoff into surface waters may be increased during rainstorms. Further research may help improve understanding of these factors; but there is already plenty of evidence showing clearly that it is illusory to assume that there is an "average" environment for estimating pesticide risks.

Implications and Suggestions for Change

In conclusion, the problems of applying the North's risk assessments and standards in the South reveal yet another important reason to challenge and reject the use of risk assessment. It is irresponsible and unethical for the EPA, pesticide firms, and international agencies to give advice based on these analyses to decision-makers around the world under the pretense of objective facts. People in developing countries need to recognize the fallacies of these kinds of evaluations based on controlled or dissimilar conditions. It is wrong and can be dangerous and harmful for governments in the South to trust and rely on risk assessments and standards based on such analyses.

The use and avoidance of pesticides in developing countries demand analyses that are different from those presently used in rich countries. (The analyses likewise need to be changed in the North for many reasons.)

This does *not* mean, however, that the developing countries do not need information from the North. On the contrary, comprehensive information and expertise concerning pest control and pesticides are urgently needed and welcome in the South, and obviously the Northern countries need to share the information and know-how they possess. However, the type of information needed must be unbiased, not based on artificial tests, and adapted to local conditions. Countries of the South also need to develop alternative forms of pest control and their own scientific and decision-making processes to assess chemicals, control, responsive to local conditions and vulnerabilities.

As alternatives to the usual risk analysis approach, "worst case" analyses and other methods based on reality and caution could serve countries of the South far better than imported risk assessments. It is necessary for all nations – both rich and poor – to develop democratic processes to evaluate the costs and benefits of pesticides and non-chemical resource management. The involvement of workers, farmers, and common citizens is crucial for appropriate assessments of what is "hazardous" or "acceptable" to society. Forums need to be established to promote healthy debate and discussion of what constitutes dangers, hazards, and different levels of risk; human values and ethics must be confronted.

Lori-Ann Thrupp is Director of Sustainable Agriculture, Center for International Development and Environment at the World Resources Institute, 1709 New York Avenue, N.W., Washington DC 20006; phone (202) 638-6300; fax (202) 638-0036.

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[1] The term "developing countries" is used in this article, for lack of a better term, recognizing that it is inadequate and biased (but preferable to "less-developed" and "Third World" countries). "The South" will also be used in this context; it is a term preferred by some activists for what is often called the "Third World." The "North" refers to industrialized or "developed" countries in this article.

[2] Synopsis from L.A. Thrupp. 1991. "Sterilization of Workers from Pesticide Exposure: The Causes and Consequences of DBCP-Induced Damage in Costa Rica and Beyond," 1991, International Health Services, *Vol 21, No 4, pp 731-757. Also see summary: L.A. Thrupp. 1989. Direct Damage: DBCP Poisoning in Costa Rica.* Pesticide Action Network International: Dirty Dozen Campaigner. *May, pp 1-5. For update see, "More Costa Rican Lawsuits Seek Payment for Pesticide Damages." 1993.* Environment Watch: Latin America, *September, p. 15.*

[3] Further information on these problems can be found in other articles in this issue and in M. O'Brien. 1988. "Quantitative Risk Analysis: Overused, Underexamined." Journal of Pesticide Reform *8(1): 7-10.*

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[10] G. Hartley and G. Bryce. 1980. "Penetration of Pesticides into Higher Plants." Physical Principles of Pesticide Behavior. *Vol 2:545-657. N.Y.: Academic Press.*

[11] R. Suskind. 1977. "Environment and the Skin." Environmental Health Perspectives *Vol 20:27-37.*

[12] D. Whorton, Environmental Toxicologist, personal communication, 1986. This situation also applies to extremely hot climates in the U.S.

Pesticides in China

by Paul Thiers

Westerners often have a romantic image of Chinese agriculture as a highly sustainable, traditional system now feeding over one billion people. While traditional and innovative examples of sustainable agriculture can still be found in China, the dominant agricultural system has already shifted far from this ideal. Traditional methods are rapidly being replaced by chemical intensive, industrialized agriculture. In Eastern China, chemical fertilizer and pesticide application rates are among the highest in the world. Estimates of China's total pesticide use vary widely, but active ingredient totals appear to have doubled in the past six years from about 160,000 metric tons in 1985[1] to more than 300,000 tons in 1991.[2] China's pesticide production reached 230,000 tons in 1991 and continues to rise.[3] By some estimates, China is both the second largest importer and producer of pesticides in the world.[4]

Transnational pesticide manufacturers have moved quickly to capitalize on China's rapidly expanding market and to take advantage of this relatively cheap and unregulated location for production. There is no organized environmental or consumer health movement in China, and international NGO's have made little contact with this one fifth of the world's population. Virtually all public information on pesticides comes from transnational pesticide manufacturers and the Chinese government (itself a major pesticide producer). This article will highlight some major problems surrounding China's pesticide policy and use, as well as some emerging opportunities for pesticide reform.

Familiar Problems

China suffers from all of the problems commonly associated with pesticide use in the Third World. Illiteracy, unavailability of protective equipment and misinformation lead to pesticide misuse and overuse. In response to pesticide resistance, farmers use stronger doses and increasingly frequent pesticide applications. While no systematic research is available, anecdotal reports of farmworker poisonings and pesticide residues on food are common. The increasing costs of chemical inputs forces marginal farmers off the land. In addition to these familiar problems, the Chinese bureaucracy and quasi-free market system actually encourage pesticide use and abuse.

There is no reliable data on pesticide poisonings in China, but estimates indicate that the problem is considerable. In 1987, the Chinese Ministry of Agriculture estimated that pesticide poisonings killed up to 10,000 people a year.[5] A rash of poisonings following the introduction of organophosphates in the 1970s led many farmers to refuse to use pesticides. Chinese extension agents conducted a workshop and radio campaign to reassure farmers that pesticides were a necessary part of agricultural modernization and that serious health effects could be avoided through simple precautions.[6] Farmer acceptance of pesticides is now common. However, researchers with experience in the extension service report that the poisonings and deaths continue, often due to unauthorized mixing of pesticides or the illegal production and use of unregistered chemicals.

On a recent trip through China's east central province of Hebei, I observed 20 to 30 farmers using backpack sprayers on cotton and vegetable fields. Only one farmer appeared to be wearing eye protection, and few wore gloves. Most workers wore short sleeve shirts, and some had open-toed shoes. Pesticide bottles by the sides of the fields indicated that these workers were applying a mixture of parathion and another chemical identified only by the Chinese brand name Weilishamie, both manufactured in China. The use of parathion on vegetables is officially prohibited in China,[7] and even if its use were limited to cotton, the small size of Chinese fields makes pesticide drift onto vegetables almost inevitable. Interviews with agricultural scientists later confirmed that parathion and methyl parathion are commonly used against the cotton bollworm *Heliothis armigera* in cotton and vegetable fields, sometimes as frequently as three times per week.[8] An advertisement appearing recently in a government published pesticide handbook failed to mention any restrictions on parathion calling it suitable "for use on all field crop insect pests."[9]

Pesticides and Consumers

Pesticide residues are reaching consumers. Lan Zhusheng, Vice Dean of the Hebei Academy of Agricultural and Forestry Sciences, says that the testing laboratory at his academy frequently detects residues far in excess of legal limits on cucumbers, tomatoes and other foods. No comprehensive data is available, but

photo by Paul Thiers

Worker spraying a mixture of parathion and "Weilishamie" (a Chinese pesticide, active ingredients unknown). in Hebei Province, China, 1993.

occasional newspaper reports give some indication of the scale of the problem. In southern China's Guangdong province, 101 cases of pesticide residues on vegetables, poisoning 2,086 people, were reported in the first nine months of 1991.[10] Pesticide contamination of Chinese export products has received international publicity as in several cases of methamidophos poisoning among Hong Kong consumers eating contaminated vegetables imported from southern China.[11]

In addition to health risks for farmers and consumers, the high costs of pesticides and other inputs associated with "modernization" are eroding the economic viability of Chinese agriculture. Cotton farmers in Hebei can expect gross sales to bring in roughly US$400 per acre; pesticides for that same acre will cost about US$150.[12] In the more remote southwest, two annual harvests of rice will bring farmers about US$290 per acre per year while pesticides used to achieve those yields will cost about US$130.[13] (In both cases individual farm families will probably farm less than one acre with proportional decreases in gross sales and pesticide costs.) As input prices increase and farm gate prices decline due to the removal of government subsidies, farming becomes less and less viable. Rural unemployment is said to be approaching 100 million and may triple by the end of the decade as agricultural "modernization" continues.

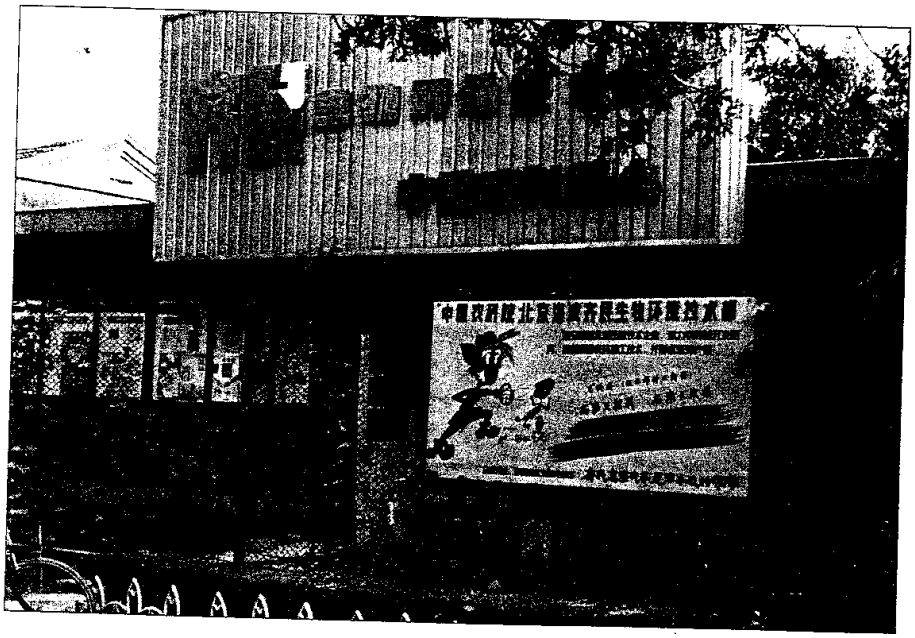

photo by Paul Thiers

To replace shrinking budgets, many agricultural universities and research institutes are opening pesticide sales offices like this one at the Chinese Academy of Agricultural Sciences in Beijing.

Pesticide Distribution and Promotion

China is currently undergoing a dramatic and unprecedented shift from a planned socialist economy to a mixed economic system dominated by relatively unregulated free-market exchange. This complex mixture of contradictory economic systems has direct ramifications for how pesticides are distributed and promoted. There are three different paths by which pesticides make their way from factory or port of importation to farmers: the government supply system, the free market, and the black market.[14]

For decades all pesticide production and distribution in China was controlled by the Ministry of Chemical Industries and the Ministry of Agriculture. Pesticides were allocated through provincial, prefecture and county agencies in accordance with state production plans, much as a University distributes its budget among various departments. In such circumstances, provincial and local agencies have an incentive to use up their full allocation in order to avoid reductions the following year.

In 1984 extension agents at the county and village level began selling pesticides directly to farmers in conjunction with their duties as agricultural advisors. Since the mid-1980s, shortfalls in government revenues have led to new fiscal policies requiring that all agencies raise increasingly large portions of their budgets through commercial activities. For extension agents this means that increasing pesticide and fertilizer sales are the only way to maintain and increase their salaries. Agricultural universities and research academies are setting up pesticide production and sales facilities to maintain their own budgets, sometimes as joint ventures with foreign corporations. The obvious conflicts of interest within this system may explain why agricultural scientists and extensionists continue to push chemical inputs.

Pesticides are increasingly distributed through the free market with relatively little government control. To obtain product registration a sample must be submitted to the Pesticide Appraisal Office of the Ministry of Agriculture where it will be tested for efficacy and safety. Once registered, it may be bought and sold throughout the country.

Some pesticides are distributed and even produced without government control or regulation. This black market system relies on personal connections and corruption. Frequently a village leader or wealthy far mer with family ties higher up will be able to acquire a large amount of pesticides from a government or private factory or warehouse. This "entrepreneur" will then sell these products locally. There are also reports of unregistered production of "home-made" pesticides formulated from chemicals obtained through various channels.

Into this mix of state, free-market, and underground distribution systems come transnational agrochemical corporations. As mentioned, joint ventures with foreign agrochemical firms offer government institutions an opportunity to compensate for government budget cuts. Special "research institutes" and sales offices have been established in such wide ranging agencies as the Chinese Academy of Agricultural Sciences and the Chinese Agricultural Film Studio. City and provincial governments are using tax breaks and other incentives to encourage agrochemical producers to set up plants in China. For example, the city of Shanghai has been working aggressively to lure international chemical manufacturers to a new development zone in the eastern part of China's most populated city. This zone already

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boasts a US$25 million pesticide factory where Du Pont produces the rice herbicide Londax (bensulfuron methyl) for both domestic and export markets.[15]

Agrochemical manufacturers have good reason to move production facilities to China. It allows them to sell to the growing Chinese market without paying the 30% tariff on imported pesticides. Simultaneously, they can take advantage of tax breaks, cheap wages and lax safety and environmental regulations to produce pesticides for export. China's stated reservations about full compliance with exporting country requirements of the UN Prior Informed Consent agreement[16] offers further incentives for corporations hoping to avoid pesticide export controls. As foreign investment augments the considerable state owned production system, China is poised to become a major pesticide exporter. More than 30,800 tons of pesticides were exported in 1989, 6.7 times the 1985 total.[17]

Positive Trends

Despite the persistent and increasing production and use of pesticides in China, there are some hopeful signs. While China has no organized pesticide reform movement, awareness of the negative consequences of pesticides appears to be growing among members of the government and the public. Li Xiaoyun, Director of the Center for Integrated Agricultural Development at Beijing Agricultural University, spoke recently about attempts to bring the goal of environmental sustainability into government agricultural policy. He said that while the mainstream of government is still committed to agricultural "modernization" along the western model, advocates of alternative agriculture are finally able to express themselves openly, even to top leaders. Vice Agriculture Minister Hong Fuzheng's publicly admitted in 1993 that 25 million acres (about 10% of China's arable land) have been seriously degraded by urban waste, pollution from rural factories, and the overuse of farm chemicals. This admission reflects a new openness about environmental problems.[18]

Chinese consumers, especially the growing urban middle class, are becoming concerned about pesticide residues on food. Some shoppers now prefer vegetables with insect damage because they believe such food is less contaminated with chemical poisons.[19] In urban food markets some farmers have even used signs to draw attention to insect damage on "pesticide free food."

Green Food

One of the most interesting recent developments has been the government sponsored "Green Food" label on processed foods. The Green Food Development Center, established by the Ministry of Agriculture in 1990, allows more than 300 products to carry its label as an indication of environmentally sound production. However, Green Food certification does not imply that food has been grown without chemicals, only that chemical use has been kept within certain limits. Green Food representative Han Zheng explained that these limits will gradually be reduced until production is chemical free. Han also stated that Green Food certification includes standards for soil and water quality, additive free processing, and environmentally sound packaging.[20]

While Green Food may represent a remarkable leap of environmental consciousness on the part of the Chinese government and an important incentive for a transition to a less chemically intensive agricultural system, there are indications that the Green Food label should be viewed with some skepticism. Although more than three hundred products have been "certified," Han was unable to produce written standards for any aspect of certification requirements. Furthermore, while individual farmers technically may apply for certification, Han said that this would be "difficult." When pressed, he admitted that virtually all Green Food products came from the State Farm System (Nongken), a vast network of state run farms and forests. As of the end of 1992, the State Farm System controls more than 4.4 million hectares of crop land, 2.6 million hectares of forests, and employs more than five million staff and workers. The system also utilizes just under six million "social laborers" (shehui laodongzhe) an ambiguous term which may include prison labor.[21] A cynical interpretation of Green Food might be that the government is using a "green" label to get a relatively higher price or greater market share for its own products rather than competing directly with independent, small farmers. In any event, consumers both inside and outside of China (many Green Food products are designed for export) should be aware that the Green Food label implies no independent certification and supports a centralized and coercive agricultural system.

Chinese Ecological Agriculture

A more promising, if less publicized, trend is Chinese Ecological Agriculture (CEA), a term which appears more and more frequently in academic journals and government policy. A recently published book on the subject defines CEA as an agricultural system which

> *"utilizes ecological principles and methods of system science to combine the effectiveness of modern science with traditional agricultural technology to establish an ecologically appropriate and functionally regenerative agricultural system. In accordance with national needs, Chinese ecological agriculture combines economic, social, and ecological benefits to achieve low input, high efficiency agricultural production."*[22]

Unlike industrial agriculture, CEA values labor intensive methods. It does not reject chemical pesticides and fertilizers but rather stresses their "appropriate" use. CEA experimental farms take a holistic approach including temporally and spatially complex intercropping systems, on-farm energy production, and an emphasis on reducing external inputs.

Perhaps the most significant aspect of CEA is its respect for traditional agricultural techniques. By seeking to augment rather than replace traditional agriculture, CEA represents a significant alternative to the modernization ideology which has dominated agricultural policy since the mid 1970s. Li Zhengfang, Director of the Rural Ecosystem Division of the Nanjing Institute of Environmental Science and a leading advocate of CEA, recently wrote that "China's agricultural development can't go the same way as the western developed countries have done, the so called petro-agriculture with high input, high investment, high consumption and high output."[23] This is a revolutionary statement in China indicating that sustainable agriculture advocates, researchers and farmers may be able to use CEA as a conceptual framework with which to press for significant changes.

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safety laws (see box, page 12). The significant uncertainties inherent in the risk assessment process necessarily undermine its value as the central basis of policy decisions concerning individual and public health.

Nonetheless, the chemical industry and corporate agribusiness interests are great supporters of risk assessment. This is primarily because it is a game they usually can win. Risk assessment is expensive, requiring the generation of laboratory test data and the employment of chemists, toxicologists, epidemiologists, statisticians and the like. But risk assessment is also easy to manipulate by changing assumptions and picking and choosing among various toxicological data. With shrinking budgets, government agencies are virtually precluded from developing independent data for their own risk assessments and must consequently rely almost entirely on data supplied by industry. Industry demands that much of these data be kept confidential under trade-secret claims. Moreover, few environmental groups have the resources even to employ a toxicologist to critique industry or government risk assessments, let alone develop and present their own assessments.

There is no doubt that risk assessment has gained much currency over the last decade, serving as the basis of essentially all food safety, indeed all toxic chemical regulatory decisions in the U.S. and many other countries. [3] Nevertheless, many experts in the environmental and consumer communities and even the public at large have begun to recognize the folly of basing all of our toxic chemical decisions on an expensive and resource-intensive technique that is fraught with scientific uncertainty and lacking a solid moral basis. The last few years have seen a backlash against over-reliance on risk assessment. Witness California's Proposition 65, an initiative put on the ballot and passed by a concerned public, which relegates risk assessment to a back seat by requiring that products containing carcinogenic and reproductive toxins be labeled in a manner that effectively warns the consumer.

In addition, there is increasing reference even among government regulators to the *precautionary principle*, which essentially directs that, when faced with a lack of knowledge about potential adverse health effects of a chemical, the prudent course is to prevent exposures.[4] Given time to grow, these new directions might have been successful in at least pushing risk assessment out of the picture in cases where the uncertainties associated with the lack of complete health effects data or the possibility of multiple exposure routes were great enough to undermine confidence in the results of quantitative risk calculations.

Never to be out-flanked, however, the chemical and agribusiness industries had a trick up their collective sleeves, and it appears to have largely succeeded. The trick was to use multi-lateral trade agreements to lock in the use of risk assessment for setting all pesticide and food safety standards by U.S. regulatory agencies (and their counterparts in other countries). One consequence of this approach is to greatly limit the ability of governments to ban or restrict food-use pesticides in the face of scientific uncertainty about their effects. It essentially forces the government to *prove* unacceptable risks *before* regulatory action can be taken.

Trade Agreements and Risk Assessment

Beginning in the late 1980s, many industries saw the potential to use multi-lateral trade agreements to influence and manipulate the U.S. food safety regulatory system in a way not always possible to do in the U.S. Congress. Trade agreements, they reasoned, could be used to superimpose a whole new set of criteria for food safety regulation, under the guise of promoting trade in agricultural products and harmonizing food safety regulation around the world. [5]

Environmental and consumer groups were somewhat slow to fully discover industry's agenda, having been absorbed in almost daily battles over food safety regulations in Congress and the state legislatures. They did catch on, however, in late 1990 and early 1991. Their efforts, while far from successful, exposed the industry agenda and may have at least weakened some of the worst aspects of the recently approved North American Free Trade Agreement (NAFTA) and the renegotiated General Agreement on Tariffs and Trade (GATT).

Both NAFTA and the revised GATT Agreement require, under virtually all circumstances, that sanitary or phytosanitary measures (SPS) adopted by federal, state or local governments be based on a risk assessment. [6] SPS meas ures include such things as regulations for allowable pesticide residues in food; produce labeling requirements related to food safety; and protoc ols for testing for food contaminants. [7]

NAFTA Risk Assessment Requirements

The text of NAFTA is quite byzantine. Reading one paragraph standing alone might lead you to wonder whether the environmental and consumer leaders who opposed NAFTA were overreacting. But if you keep reading, the pieces begin to fall into place. This is particularly true with respect to the requirements for risk assessment.

For example, Article 712(1) of NAFTA seems like an eminently reasonable premise. It provides that each country that is a party to NAFTA (the U.S., Canada and Mexico, for now) may:

> *...adopt, maintain or apply any sanitary or phytosanitary measure necessary for the protection of human, animal or plant life or health in its territory, including a measure more stringent than an international standard, guideline or recommendation.*

This same article of NAFTA goes on to state that each country can "establish its appropriate levels of protection." [8] Under these two provisions of NAFTA alone, a country could seemingly choose whether to base its standard on zero, ten, one hundred or any other number of additional cancers in the population. Conceivably, then, a country could decide that zero risk, period, was its "appropriate level of protection."

Indeed, the U.S. government's Statement of Administrative Action that accompanied NAFTA through Congress contains a discussion of whether NAFTA invalidates the Delaney Clause of the federal Food, Drug and Cosmetic Act. (The Delaney Clause essentially requires a level of zero risk for cancer by prohibiting carcinogens in processed foods.) [9] The Statement of Administrative Action notes that:

> *The NAFTA was carefully drafted, with the Delaney clauses and other provisions of U.S. law firmly in mind, to safeguard the ability of governments to ensure food safety . . . The Delaney clauses are entirely consistent with NAFTA's requirements ...* [10]

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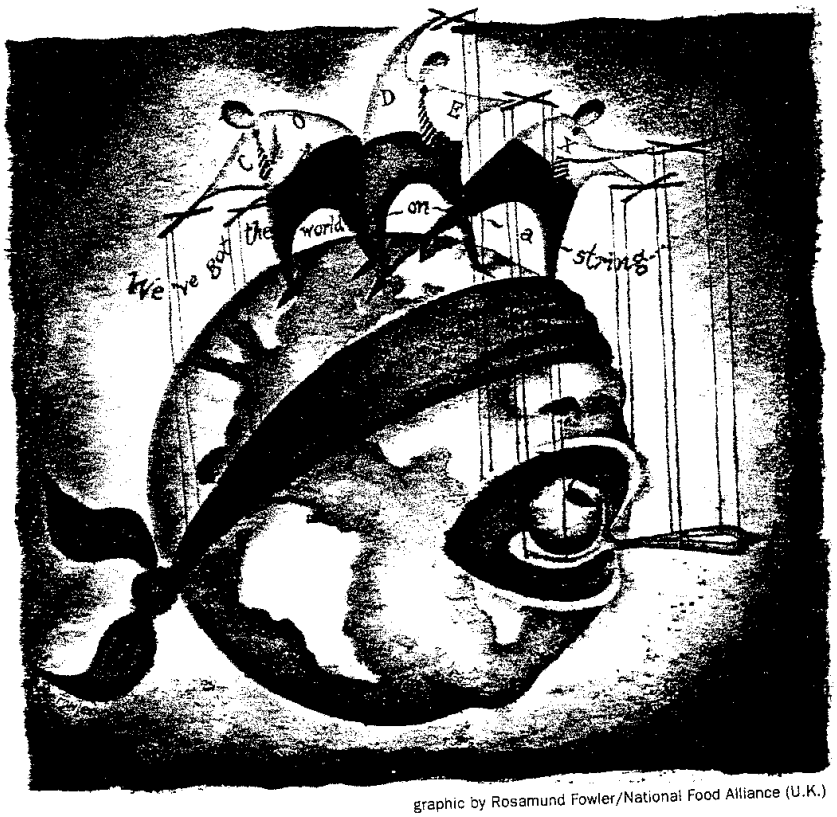
Strong pressure from environmental organizations and members of the public, as well as the pressure from Congressional leaders like California's Henry Waxman, helped push the Clinton administration to at least clarify its interpretation of NAFTA with respect to measures such as the Delaney Clause. Under NAFTA, however, one country can bring a challenge against another country's laws or regulations through a process known as dispute resolution.[11] It remains to be seen what weight will be given to the United States' unilateral interpretation of the text if the matter is brought up before one of NAFTA's dispute resolution panels. That is, will a dispute resolution panel defer to the U.S. interpretation if the challenger presents a different interpretation of the text?

But several other provisions of NAFTA also apply to pesticide standards for food.[12] First, Article 712(3)(c) expressly requires that any sanitary or phytosanitary measure be "based on a risk assessment, as appropriate to the circumstances." The definition of "risk assessment" in NAFTA is fairly broad, going beyond the quantitative risk assessments that are generally used for carcinogens.[13] This implies that governments may have to develop new protocols for assessing the risk of a variety of other types of adverse health effects of pesticides, and qualitative risk assessment may satisfy that criteria.

In an effort to further constrain government decision making, Article 715 of NAFTA defines a whole set of criteria for conducting risk assessments. Governments are, for example, required to consider use of international methods of risk assessment and the objective of minimizing negative trade effects of regulation. They are also required to avoid "arbitrary or unjustifiable distinctions" in choosing the appropriate level of protection. NAFTA also contains provisions allowing one country to challenge another's regulations. It is unclear from the NAFTA text whether failure to observe or consider even one of the many Article 715 criteria for risk assessments could make a standard vulnerable to challenge on the grounds that it was inconsistent with NAFTA.

These risk assessment requirements apply to federal, state and local SPS measures,[14] with the only exception being the case where a government agency adopts an "international" standard or guideline as its own. International standards are those set by organizations such as the Codex Alimentarius Commission, which is strongly influenced by industry groups and inaccessible to the public;[15] the obscure International Office of Epizootics; or similarly unaccountable, insulated international bodies. These international standards, which, in the case of pesticides, are often much less stringent than U.S. standards,[16] are *presumed* to comply with NAFTA's requirements for SPS measures, including the risk assessment requirement.[17]

Many observers in the environmental community feel that NAFTA's SPS provisions could, at a minimum, have a chilling effect on innovative efforts to protect the quality of the food supply and promote organic food alternatives. For example, recall that the definition of SPS measures includes labeling requirements. Could the NAFTA risk assessment provisions be used by Canadian food exporters to challenge a U.S. state's requirements related to labeling of organic food? While the answer is not immediately clear from the text, these kinds of questions may arise upon NAFTA's implementation.



graphic by Rosamund Fowler/National Food Alliance (U.K.)

Another important question is what type of requirements NAFTA imposes on government regulations in cases where there is not enough toxicological or other data to complete a risk assessment. This is likely to be the case for many currently registered pesticides.[18] In this situation, Article 715(4) of NAFTA provides that a country may adopt a "provisional" standard on the "basis of available relevant information." It also requires, however, that within a "reasonable period of time" after sufficient information to complete a risk assessment is presented to it, the country must revise the provisional measure on the basis of a risk assessment. All of the foregoing considerations are magnified because NAFTA essentially allows domestic standards to be "second-guessed" through its secretive dispute resolution process.

GATT Risk Assessment Requirements

Prior to its recent renegotiation under the Uruguay Round, GATT contained very few express provisions related to sanitary and phytosanitary measures. In general, standards for pesticide residues in foods, for example, would stand or fall in the face of a challenge on the basis of whether they met provisions of Article XX(b) of the GATT text. This allows countries to adopt "measures necessary to protect human, animal and plant health or life," even if those measures violate other provisions of GATT.[19]

The new GATT SPS Agreement, finalized in December 1993, is expressly designed to elaborate on the application of Article XX(b) to SPS measures. The text of the new SPS Agreement is somewhat more transparent in its objectives than NAFTA. First, it states flatly:

> *To harmonize sanitary and phytosanitary measures on as wide a basis as possible, Member [countries] shall base their sanitary and phytosanitary measures on international standards, guidelines or recommendations, where they exist, except as otherwise provided for in this Agreement.*[20]

Similar to the situation under NAFTA, any of the over 100 GATT signatory countries can only go beyond an international standard if it conducts a full risk assessment. [21] The GATT SPS Agreement also sets out criteria for conducting risk assessments in support of SPS measures that are more stringent than international standards. These criteria are similar to those set forth in Article 715 of NAFTA. [22]

The GATT SPS Agreement, however, goes a step further with respect to risk assessment. It requires that countries cooperate with a Committee on Sanitary and Phytosanitary Measures in establishing guidelines for choosing the appropriate level of protection against which risk assessment results are to be judged. This Committee will be required in developing these guidelines to consider the "exceptional character of human health risks to which people voluntarily expose themselves."[23] Although the language is vague, it could be argued that it means the Committee must establish guidelines that force or encourage countries to choose a level of protection from cancer-causing pesticides that does not result in less risk than, say, the voluntary risk one assumes by smoking cigarettes, despite the fact that not all people choose to smoke.

Conclusion

Due primarily to the efforts of environmental and consumer advocates, both NAFTA and GATT expressly give governments the right to adopt laws and regulations that go beyond international food safety standards. However, that right is limited by the cumbersome and constricting risk assessment requirements imposed by both agreements. It is certainly conceivable that many regulators, especially those in developing countries and U.S. state and local agencies that have only limited toxicological and risk assessment capabilities, will choose to adopt the international standards to avoid the expense and resource drain of risk assessment. These regulators may also tend to adopt international standards in an effort to ensure that their regulations are not vulnerable to challenge under NAFTA.

We may not know how severe these and other constraints turn out to be until challenges to SPS measures are brought before NAFTA and GATT dispute resolution panels. What *is* clear, however, is that the corporate agenda of limiting its responsibility for the risks of toxic chemical production and use through the easily manipulated art of risk assessment has become a part of precedent-setting trade agreements. The industry strategy of using trade agreements to constrain government regulatory authority has been substantially advanced.

Environmental and consumer advocates thus have many new tasks. First, we must begin to analyze all the fine print of NAFTA and the new GATT SPS Agreement, which is scheduled for Congressional consideration this spring. Second, where possible, we need to develop strong arguments for favorable interpretations of the text to limit the application of the most damaging portions. Third, we need to investigate and publicize the workings of international standard-setting bodies. Finally, we need to develop effective methods of requiring these international institutions to incorporate meaningful and regular public participation in all aspects of their operations. If we are not up to these tasks, the public will lose many of the advances made in food safety regulation and will be foreclosed from convincing their governments to adopt alternative, stronger forms of protection for the consumer in the future.

Mary Kelly, an environmental lawyer, is Director of the Austin-based Texas Center for Policy Studies.

References

[1] *Howard A. Latin, "The Significance of Toxic Health Risks: An Essay on Legal Decision Making Under Uncertainty," 10 Eco. L. Q. pp 339 and 371, 1982.*

[2] *A dose-response model is a mathematical model used to extrapolate results of chemical tests, usually at high doses on animals, to potential effects on humans at low doses. It is most often applied to predict carcinogenic effects.*

[3] *Risk assessment is also finding great favor with industries managing hazardous wastes. One Texas environmental attorney reports that discovery in a recent case against a large chemical company turned up a document in which the company's environmental staff boasted of using risk assessment studies to delay clean-up of hazardous wastes, saving the company millions of dollars. James Blackburn, "Assessing the Risk of Risk Assessment" (1993) (copy in author's file).*

[4] *The author thanks Michael Gregory of Arizona Toxics Information, Inc. for this succinct definition of the precautionary principle.*

[5] *For an interesting discussion of the evolution of industry's agenda, see Mark Ritchie. "Agricultural Trade Liberalization: Implications for Sustainable Agriculture" in* The Case Against Free Trade, *Earth Island Press, 1993.*

[6] *North American Free Trade Agreement (NAFTA), Arts. 712(3)(c), 715; Agreement on the Application of Sanitary and Phytosanitary Measures ("SPS Agreement"), Uruguay Round of GATT Negotiations, Paras. 16-23 (Dec. 1993).*

[7] *NAFTA, Art. 724 (Definitions).*

[8] *NAFTA, Art. 712(2).*

[9] *Delaney Paradox, supra, n. 3.*

[10] *Statement of Administrative Action Accompanying the North American Free Trade Agreement, November 1993. pp. 93-94.*

[11] *Much has been written about the troubling secretive nature of GATT and NAFTA dispute resolution panels. See, for example, Walter Russell Mead, "Bushism Found," in Harpers Magazine, September 1992, pp. 37-45 and Lori Wallach, "Hidden dangers of GATT and NAFTA" in* The Case Against Free Trade.

[12] *This article is limited to a discussion of the provisions of NAFTA regarding risk assessment. There are other provisions of Chapter 7 of NAFTA on SPS standards that may be of concern. Also, regulation of pesticides for their environmental effects (such as groundwater contamination) that are not always directly related to animal, plant or human health may be affected by the provisions of Chapter 9 of NAFTA regarding technical standards.*

[13] *Statement of Administrative Action,* supra, *p. 94. NAFTA, Art. 724 (Definitions).*

[14] *NAFTA, Art. 105.*

[15] *The Codex Commission is a subsidiary body of the United Nations Food and Agricultural Organization (FAO). The U.S. Department of Agriculture and the Food and Drug Administration, which participate in Codex, depend heavily on advice from food and chemical companies in formulating their positions for Codex. The Commission does not have any process for public input or scrutiny of its decision making process. See Tom Hilliard, "Trade Advisory Committees: Privileged Access for Polluters." Public Citizen, December 1991, pp. 27-28.*

[16] *A 1992 General Accounting Office (GAO) report found that Codex's standards for residues of carcinogenic pesticides in food were less stringent than U.S. standards for over 50% of the pesticides examined.*

[17] *NAFTA, Art. 713(2).*

[18] *General Accounting Office.* Pesticides: EPA's formidable task to assess and regulate their risks, *GAO/RCED-86-125, 1986.*

[19] *The spare text of Art. XX(b) has been interpreted by various GATT dispute resolution panels to encompass a variety of tests. A full discussion of this provision is beyond the scope of this article, but for a thorough examination see Robert Housman and Durwood Zaelke. "Trade, Environment and Sustainable Development: A Primer." 15 Hastings Int'l. & Comp. L. Rev. pp. 535, 546-50, 1992.*

[20] *GATT SPS Agreement, Para. 9.*

[21] Ibid., *Paras. 11, 16-23.*

[22] Ibid., *Paras. 16-23.*

[23] Ibid., *Para. 20.*

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Pesticide use is the only activity they analyze or consider. The only question they ask is "How *MUCH* pesticide pollution?"

When Should Pesticide Risk Assessments be Rejected?

There is no question that we all assess hundreds of risks every day. We decide when we will cross a street; whether we will smoke or not; whether a cooking pot is too hot to lift with our bare hands. But if we are accurate, we don't pretend these various activities are safe, and we consider our options to taking on the risk. Do we really need to run in front of the oncoming car, or can we wait a few seconds? What are some ways we can enjoy life without smoking? Is there a pot holder nearby that we can use to pick up the pot? Can we turn off the heat and wait a minute?

Since we each do risk assessments everyday, what is so threatening about pesticide risk assessments and decision-making processes that employ these assessments? The threats to our lives and environment presented by pesticide risk assessments arise from two sources. First, most pesticide risk assessments attempt to describe a safe or acceptable unconsented exposure to pesticides; and secondly, most decision-making processes employing pesticide risk assessments do not consider, let alone assess, alternatives to pesticide use.

For these reasons, I would suggest that the pesticide reform community do the following:

1. Reject any pesticide risk assessment that claims to estimate safe amounts of pesticide exposure. The only scientifically defensible pesticide risk assessment is one that estimates a particular *harm* for relevant, specified organisms and conditions based on evidence (e.g., predicting birth defects in children of healthy women exposed to a particular pesticide ingredient based on experimental or epidemiological evidence on birth defects involving that pesticide ingredient).

What is *not* scientifically defensible is a claim of "safety" for a pesticide that has not been tested for all possible types of harm, for all types of physical conditions and all types of organisms, by

How Are Pesticide Risk Assessments Constructed?

Pesticide risk assessments are generally used to estimate how much of a pesticide can be released or received by humans (or some other animal) without causing harm or unacceptable harm.

Generally, these risk assessments are based on experimental animal or, more rarely, human health data about some kind of harm or hazard that is caused by a single pesticide ingredient. The experimental data are generated by exposing rats, dogs, mice or other animals to various amounts (doses) of the pesticide and observing the doses at which harm does or does not occur. Usually fairly high doses of the pesticide are used, because few animals are tested rather than hundreds or thousands that would be needed to detect effects of the lower doses normally encountered in the real world.

The kind of experiment done (e.g., route of exposure, length of experiment) depends on which kind of harm is going to be observed (e.g., cancer, reproductive damage, respiratory damage, eye irritation).

The implications for humans of the results observed in the experimental setting are then estimated, taking into account various factors, such as body weight, length of life, or metabolism of the pesticide, and the dose of pesticide that the humans (e.g., workers, people eating the pesticide on food) would be expected to encounter. Sometimes pesticide risk assessments are done for non-humans. For example, "Will trout offspring die if X amount of pesticide is in the river?"

Risk assessment for any toxic chemical is done in the same manner and has the same problems as those done for pesticides. These include the following:

1. In the real world, humans and other animals are exposed to numerous toxic chemicals, by numerous routes of exposure (e.g., air, water, food), and not to one chemical via one route of exposure as in the experiments. The real world of cumulative and synergistic toxic chemical exposure is ignored in most risk assessments. Even if the risk assessors wanted to include such information, it generally does not exist.
2. In the environment, pesticides often break down into other chemicals (called metabolities or degradation products), some of which may be more toxic than the pesticide ingredient that was tested.
3. Pesticide formulations generally contain numerous chemicals (e.g., solvents and surfactants), but usually only the ingredient that supposedly kills the pest is tested. Therefore, a pesticide risk assessment does not address the complete product formulation.
4. Certain types of harm (e.g., hormone disruption, immune suppression, and all types of nerve damage) are rarely studied in experiments on pesticides, and therefore are ignored in the risk assessment.
5. Pesticide experiments are generally performed using adult, healthy, genetically identical animals. In the real world, developing embryos, infants, immune compromised people, genetically susceptible people, and ill people are exposed, but are not and generally cannot be considered in risk assessments.
6. Risk assessments are necessarily full of assumptions: dose-response assumptions, estimates of food consumption, extrapolations from animal experiments, etc. This is where risk assessments are routinely manipulated to elicit desired answers.

Because pesticide risk assessments do not, will not, and cannot consider all kinds of potential harm, all kinds of conditions of the exposed organism, or the cumulative effect of all other kinds of toxic chemicals and other stresses being experienced by the organisms exposed to the pesticide, pesticide risk assessments can only estimate some kinds of *harm* to some kinds of organisms under certain conditions. The inescapable conclusion is that pesticide risk assessments cannot describe "safe" levels of pesticide exposure.

all routes of exposure, and in combination with all other toxic chemicals those organisms are encountering (see box, page 12). It is impossible scientifically to claim "safety" for pesticides.

2. Reject the use of any pesticide risk assessment that allows pesticide use that will cause "acceptable" harm, or that may cause unknown or uninvestigated harm, if an assessment has not also been made of reasonable alternatives to that use of the pesticide. In other words (modifying the analogy given at the beginning of this article), before deciding that it will be acceptable to hit other people's children with a certain amount or dose of pesticide because it will not cause an "unacceptably" high risk of cancer (which may be only one of many kinds of damage caused by that pesticide), demand that pesticide users and permitters publicly and fully consider and assess alternatives to hitting children with pesticides.

Life After Pesticide Risk Assessments

Since most current pesticide risk assessments and uses of these assessments (see box on this page) need to be rejected on the grounds listed above, we must consider our strategies to stop the use of such risk assessments:

1. Develop and implement pesticide use reduction proposals and legislation. Such proposals and legislation call for a specified reduction in pesticide use (e.g., 50%) in a specified time period (e.g., five years). If less pesticide use is allowed, attention shifts from estimating how dangerous or safe pesticide formulations are, to altering the agricultural and other behaviors that depend on pesticide use. Many successful industrial toxic use reduction programs (e.g., in Massachusetts, U.S.) avoid prioritizing which toxic chemicals must first be eliminated from use by industry, and instead focus on the options that industry has to reduce its use of all toxics.

Likewise, pesticide use reduction legislation currently being developed by a broad coalition of U.S. groups emphasizes 50% reduction of pesticides by category (e.g., fungicides, herbicides, insecticides). The legislation avoids prioritization of pesticide use reduction by risk, except for targeting very highly acutely toxic pesticides ("Toxicity 1") for reduction or 100% phaseout because they cause undeniable, unavoidable suffering, particularly to farmworkers who work near the site of application. [1]

2. Develop regulations at local, state, and national levels that require consideration (or preference) of alternatives to pesticide use before pesticides can be used. This strategy is based on the thesis that pesticide users should be asked to publicly discuss alternatives to using pesticides before they commit chemical homicide and the killing of nonhuman bystanders, and contaminate everything we breathe and touch and eat from the ozone layer to the Antarctic.

The 1988 U.S. Forest Service plan for managing "unwanted" vegetation in Pacific Northwest national forests, for instance, requires that prevention of conditions that favor "unwanted" vegetation be given priority over elimination of such vegetation with herbicides. [2]

The U.S. National Environmental Policy Act (NEPA) requires all federal agencies to discuss and analyze all reasonable alternatives before undertaking or contributing to an activity that may harm the environment or public health. [3] As NEPA states, consideration of "alternatives including the proposed action ... is the *heart* of [an] environmental impact statement" (emphasis added). [4]

A recent, excellent report on chemical accident prevention (i.e., prevention of Bhopal-type accidents) notes that prevention efforts should be built around analysis of options for inherently safer technologies that prevent the POSSIBILITY of an accident, rather than planning for mere reduction in the probability of an accident or reduction in the seriousness of injuries resulting from accidents. [5] As the author notes, we need to "... shift the focus of our enquiry from risks of industrial systems to technological alternatives, i.e., from the identification of problems to the identification of solutions." [6]

The realization that there are alternatives to pesticides necessarily leads to social consideration of whether pesticides should be used when they are not essential. Imagine a woman standing beside an icy river, while risk assessors indicate she should be forced to wade across the river since (1) the river probably isn't deep, (2) she's probably too young to be at risk of a heart attack, (3) she's apparently not hypothermic, and (4) the river hasn't been shown to be toxic. Should she be forced to cross the river, even if she probably won't die doing it, if a bridge is nearby, or feasibly could be built?

3. Where a pesticide risk assessment has already been produced, challenge any implication of safety in the assessment, and require that all unknowns be explicitly listed and acknowledged. When pesticide risk assessors pretend to describe "non-harmful" levels of exposure to a

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What Are Pesticide Risk Assessments Used to Justify?

(A Few Examples)

1. Registration of pesticides
2. Denial of national and local sovereignty to limit exposure to pesticides or enact pesticide bans (free trade "harmonization")
3. Export of pesticides to countries whose climatic and worker conditions are far different from the countries in which the pesticide risk assessment was made
4. Dismissal of citizen concerns about pesticide harm
5. Unconsented exposure to pesticide drift
6. Pesticides in drinking water, food and breast milk
7. Exposure of workers to pesticides
8. Water "quality" permits to discharge pesticides directly into rivers
9. Incineration of pesticides
10. Aerial and other public pest eradication programs
11. Contamination of fish, birds and mammals
12. Groundwater contamination
13. Loss of court suits for damages to humans, domestic animals, crops, other organisms
14. Denial of health damage claims (e.g., workers compensation, chemical sensitivity, health damage following industrial explosions or fires)
15. Incomplete cleanup of pesticide spills, leaks and accidents

Sustainable Agriculture: From Policy to Field

by Barbara Dinham

The high profile the environment received during the UN Conference on Environment and Development (UNCED) in 1992 in Rio has died down. But have the issues been forgotten? The Food and Agriculture Organization (FAO), the lead UN agency on sustainable agriculture, held its biennial conference in Rome in November 1993, and reported on its progress in this area. This article looks at the process of moving sustainable agriculture from the drawing board to the field.

Sustainable agriculture is like motherhood; no one is against it. The environmental case against the overuse of chemical pesticides and fertilizers is generally accepted, as are the arguments that the health of agricultural workers and rural people cannot be sacrificed as they have been in the past. However, the key questions remain: What do we mean by sustainable? And how do we get there?

At the 1992 UNCED conference, participating governments agreed in Chapter 14 of Agenda 21, *Promoting Sustainable Agriculture and Rural Development* (SARD), to "increase food production in a sustainable way and enhance food security." However, while endorsing the FAO International Code of Conduct on the Distribution and Use of Pesticides, Chapter 14 said nothing about reducing pesticide use. It endorsed integrated pest management (IPM) and sustainable plant nutrition (fertilizer management), but set no targets to alter high input practices. In the meantime, nongovernmental organizations (NGOs) stress participation, agroecology and low external inputs, while the pesticide industry stresses its own interests. For example, according to Jochen Wulff, head of Bayer's agrochemical division, "The best way toward sustainability is through intensive agriculture, by optimizing inputs and increasing yields, while reducing acreage."[1]

SARD at FAO Conference

FAO uses this working definition of sustainability:

The management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable. – FAO Council 1988

Delegates at the biennial FAO conference in November 1993, heard of policy developments intended to re-orient FAO programs and activities towards the objectives and criteria of SARD. However, there is a time lag for implementation, and FAO funds are short. The United Nations Conference on Sustainable Development (see News Note, page 22), established to monitor and guide the follow up to UNCED, held its first substantive session in June and expressed "concern that funding (to implement Agenda 21 in general) falls significantly short of expectations and requirements."

Nevertheless, there is a climate of change at FAO. At the November Conference, many NGOs, including farmers' organizations, endorsed FAO's recent initiatives, and expressed a willingness to work together.[2] Crucial to SARD is the concept of participation. Any project has a greater chance of success when people are genuinely involved in its development and implementation — better still if it meets people's demands. This implies more time and resources devoted to democratic decision-making processes. One successful model of participation is the field farmer program in South East Asia developed by FAO under its IPM program in concert with farmers' organizations, national extension workers and governments. In this approach, farmers are trained to conserve beneficial species to manage pests rather than use pesticides; the program's application on rice production in Indonesia has saved the government $120 million a year in pesticide subsidies, while increasing farmers' incomes.

A PAN report containing a detailed investigation of FAO policies, *Sustainable Agriculture and Rural Development: FAO at the Crossroads*[3] by Michael Hansen of the U.S. Consumer Policy Institute, was launched at the Rome Conference in November. The report acknowledged that the seeds for far-reaching change have been planted within this agency. Many government representatives liked the FAO Special Action Programs for implementing SARD, and emphasized the importance of intensive collaboration with farmers' and rural peoples' organizations. Delegates also saw SARD as more than a technical exercise, and many echoed the Jamaican delegate's call for income-generating activities to reduce poverty in support of sustainable use of resources. The U.S. noted that it is time to incorporate the environmental and sustainable development initiatives into the FAO's regular program budget.

Many NGOs support integrated pest management as one element of sustainable agriculture, but stress that links between work on IPM and the FAO Code, such as identifying and eliminating pesticides which encourage insect resistance, need to be strengthened. At a meeting with FAO during the conference, international NGOs called for a tighter definition of IPM [4] closer to or surpassing that used in FAO's guideline for its field workers:

The presence of pests does not automatically require control measures, as damage may be insignificant. When plant protection measures are deemed necessary, a system of non-chemical pest methodologies should be considered before a decision is taken to use pesticides. Suitable pest control methods should be used in an integrated manner and pesticides should be used on an as-needed basis only, and as a last resort component of an IPM strategy. In such a strategy, the effects of pesticides on human health, the environment, sustainability of the agricultural system and the economy should be carefully considered.[5]

Agriculture: Towards 2010

The FAO publication, *Agriculture: Towards 2000*, published in 1987, promoted high chemical inputs, and was strongly criticized by NGOs. In line with its reorientation, FAO launched a new edition at the November conference. While still noting the role of chemical pesticides and mineral fertilizers, *Agriculture: Towards 2010*,[6] adopts a more balanced approach. It also points out their undesirable consequences and looks at the broad role of low external input, agroecology and IPM in sustainable agriculture. These approaches do not totally reject chemical


photo by Elsa Nivia

Global IPM Field Study Tour participants examining IPM model in the Philippines.

pesticides, but emphasize their use as a last resort. A recent FAO study tour in South East Asia showed some of the considerable successes already achieved with IPM, many stemming from the work of the agency's Intercountry Rice Programme (see box), followed by a meeting to discuss expanding these and other IPM models in other crops and regions.

Not surprisingly, the agrochemical industry has shown lively interest; however, their objectives often clash with low input IPM and the participatory approach. John Finney, director of development at Zeneca Agrochemicals, stresses a high-technology approach, saying industry should concentrate on "creating and transferring totally new technologies that improve economic and environmental performance."[7] Meanwhile, industry markets many of its pesticide products as compatible with IPM, suggesting lower usage, or rotation with other chemicals to allay insect resistance; some in FAO support this approach.

A Global Issue

Although pesticide markets are growing fastest in the South, intensive use of pesticides remains highest in industrialized countries. A recent NGO conference at Mulheim, Germany looked at broad policies for change (see News Notes, page 22).[8] In the UK, a conference of farmers and NGOs pointed out that significant efforts are needed to transform the current agricultural model into one that is less environmentally damaging. Participants made recommendations to the UK government, in response to its 1993 Consultation Paper, UK Strategy for Sustainable Development.[9]

The outcome of the General Agreement on Trades and Tarriffs (GATT) Uruguay round must be watched closely for its impact on sustainable agriculture. GATT is likely to increase agricultural exports from Third World countries to the North, affecting internal food security, and to exacerbate health and environmental problems of intensive agriculture (although it may inhibit the dumping of highly subsidized agricultural products from industrialized countries). These trends may further increase pesticide markets in the South, where World Bank/International Monetary Fund (IMF) structural adjustment programs encourage agricultural exports.[10] These and other conflicts between structural adjustment policies and SARD need to be clearly articulated and challenged. Structural adjustment and free trade must not be allowed to take precedence over sustainable agriculture.

There has been significant progress on developing an international policy framework for Sustainable Agriculture and Rural Development within FAO and the difficulties of this accomplishment should not be underestimated. However, tr anslating these policies into field practice, while ensuring that the changes a re participatory is the major task ahead.

Barbara Dinham is International Projects Officer at the Pesticides Trust (see back cover).

References (see page 18).

Asian farmers' successes: Global IPM Meeting

More than half a million rice farmers in Asia now manage pests using skills of observation and interpretation to analyze their crops as agroecosystems, conserve biodiversity and beneficial species, dramatically reduce pesticide use and exposure, and raise individual profits. Their IPM practices reduce threats to staple food production from major pest outbreaks, and help farmers determine what they need from agricultural research and extension systems.

From August 22 to September 3, 1993, the FAO Intercountry Program for IPM in Asia organized a Global IPM Field Study Tour followed by a four-day meeting in Bangkok. Participants on the study tour, which included crop protection workers from 22 African, Latin American and Near Eastern countries and two agronomists from NGOs, visited Bangladesh, Indonesia, Philippines and Vietnam. They examined IPM models developed by Asian farmers and village-level advisors for more than a decade, recently with the support of national IPM programs.

After the tour, participants joined representatives from FAO Intercountry Rice IPM Programme countries, donor and technical institutions and NGOs (including PAN Regional Centers) for the IPM meeting in Bangkok. Both multilateral and bilateral donors were well represented. Without the presence of the pesticide industry, participants wasted no time debating the essentiality of pesticides, and instead, began by recognizing that alternative, ecological pest management can be applied successfully on a large scale. Participants then discussed how to extend IPM in other regions and crops. An "IPM Manifesto" developed by participants stresses the need to :

- Recognize and train farmers as experts in IPM
- Make research and training participatory
- Adopt IPM as a national policy
- Eliminate pesticide subsidies
- Conduct "true costing" studies of pesticide use
- Eliminate WHO category 1a and 1b and chlorinated hydrocarbon pesticides
- Promote environmentally friendly non-chemical pest management.

A summary of the Global IPM Field Study Tour and Meeting and IPM Manifesto is now available from Peter Kenmore or Kevin Gallagher, FAO Intercountry Program, PO Box 1864, Manila, Philippines; fax (63-2) 810 9409; email IPM-Manila@cgnet.com

PAN NORTH AMERICA REGIONAL CENTER

Campaign Update: Methyl Bromide

by Anne Schonfield

Since early 1992, PAN North America (PANNA) has worked with groups in the U.S. and around the world to identify and publicize alternatives to methyl bromide, a highly toxic, ozone-depleting pesticide that is one of the most widely used fumigants in the world. At the same time, PANNA and our network partners have been pushing for rapid phase outs of methyl bromide in California, the U.S. and internationally under the United Nation's Montreal Protocol on Substances that Deplete the Ozone Layer.

United Nations' Panel

In early 1993, Mary O'Brien of the Environmental Research Foundation and PANNA's board president was one of five nongovernmental organization (NGO) representatives named to the UN Environment Programme's Methyl Bromide Technical Options Committee (MBTOC), to advise the Parties to the Montreal Protocol on international phase out schedules for methyl bromide (to be set in 1995). The committee is preparing reports on methyl bromide uses and alternatives, which will be presented to the Montreal Protocol in September 1994. At the next MBTOC meeting (March 1994 in Santiago, Chile), PANNA, PAN Latin America Regional Center RAPALMIRA, CLADES (Consorcio Latino Americano Sobre Agroecologia y Desarrollo), and other Latin American NGOs, will organize a panel and field trip to showcase alternatives to methyl bromide use. This will be the first time the Committee will hear from an NGO panel. NGOs are also preparing for lobbying at the sixth meeting of Parties to the Montreal Protocol in October 1994.

Methyl Bromide Alternatives Network

In July 1993, a U.S. coalition of environmental, farmer, labor and grassroots organizations came together to form the Methyl Bromide Alternatives Network (MBAN), which will focus on a high-visibility media campaign to eliminate methyl bromide. Since January 1994, PANNA has been coordinating MBAN activities. The goals of the campaign are to arouse public concern about this dangerous pesticide and create public pressure for a complete and rapid ban. Initially, the coalition will produce an information packet on methyl bromide to send to the media, government officials and others concerned about this pesticide.

Methyl Bromide Alternatives Network (MBAN)

Californians for Alternatives to Toxics
California Institute for Rural Studies
Central Coast Pesticide Coalition (Salinas, CA)
Coalition to Outlaw Methyl Bromide (Santa Maria, CA)
Community Alliance with Family Farmers
Federation of Southern Cooperatives (Jackson, MS)
Friends of the Earth – USA
International Brotherhood of Teamsters
National Coalition Against the Misuse of Pesticides
Natural Resources Defense Council
PAN North America
Rural Law Center/Farmworker Association of Florida

If full funding is secured, the coalition will produce a National Transition Plan (detailing alternatives to methyl bromide) and place full-page ads in major U.S. newspapers. The Transition Plan will focus primarily on California and Florida, which together comprise approximately 63% of total U.S. methyl bromide use.

In one of MBAN's first joint actions, members of the coalition sent a letter in October 1993 to U.S. Trade Representative Mickey Kantor, expressing concern about a last-minute deal on methyl bromide in return for NAFTA votes. In a promise to a Florida agriculture group, Kantor directly contradicted U.S. obligations under the Montreal Protocol, as well as the proposed EPA rule to start phasing out the chemical in 1994 (which has since been adopted). MBAN urged Kantor to publicly retract his statement and asked the Administration to "reaffirm its commitment to freeze methyl bromide at 1991 levels in 1994." The coalition has yet to receive a response from the Clinton administration.

photo by Lovejoy, Santa Cruz Sentinel

Fernando Bejarano (Greenpeace Mexico) and Anne Schonfield (PANNA) examine a cover crop on an organic farm during the October field tour in one of California's strawberry-growing regions.

Field Tour

On a different front, the Central Coast Pesticide Coalition and PANNA organized a methyl bromide field tour in October 1993. The tour visited one of California's key strawberry-growing regions, the Watsonville/Salinas area, and included field trips to organic and conventional strawberry farms, a transitional greenhouse and a farmworkers' organization. Virtually all commercial strawberry production in California uses methyl bromide as a soil fumigant. Twenty-five pesticide experts and activists joined the tour, including colleagues from Mexico, Peru, Colombia, England and Switzerland.

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Research Reports

In January 1994, PANNA published a critique of a U.S. Department of Agriculture (USDA) study on the economic effects of a methyl bromide ban. USDA's 1993 study argued that a ban (which by EPA rule will take effect in the year 2001) would have a devastating effect on the U.S. economy. PANNA's critique maintains that USDA exaggerated the impact of a methyl bromide ban, that a ban would affect only a limited number of crops in specific locations and that USDA failed to take into account existing alternatives to methyl bromide. (See back cover.)

In 1993 PANNA also began a study on the use of methyl bromide in developing countries. Graduate students at the University of Montana conducted the research and produced a draft in December 1993. PANNA staff are finalizing the study, which will include case studies of successful alternatives applicable in southern nations. We will present the report at the March 1994 MBTOC meeting in Chile.

To reserve a methyl bromide action packet or learn more about becoming involved in the campaign, contact PANNA.

Anne Schonfield is program coordinator for PANNA's Methyl Bromide Campaign.

continued from page 13, Facing Down Risk Assessment

pesticide, show that they have not considered the toxic effects of exposure to this pesticide in conjunction with exposure to other toxic chemicals and current "background" body burdens of dioxin and other human-introduced toxic chemicals. Exposure to the pesticide may be "the straw that breaks the camel's back" if it adds to or magnifies effects of exposure to other toxic chemicals.

Show that the assessors have not considered the effects of all the ingredients in the pesticide formulation and their metabolites or addressed the potential of the pesticide to cause immune suppression, endocrine disruption, or various types of nerve damage. Show that they have not considered effects of the pesticide on nutritionally compromised people, elderly people, people taking immune-suppressing medicines, and infants. Adamantly reject any risk assessment that makes false claims of pesticide "safety." You're on solid, scientific ground.

4. Consider the long-term implications of using pesticide risk assessments when they happen to support your arguments. In 1989, The Natural Resources Defense Council (NRDC) simultaneously published a report [7] and worked with CBS television to show how certain pesticide risk assessments, for instance for the cancer-causing pesticide Alar (daminozide), fail to consider special risks borne by children. Alar is a plant "growth regulator" (a pesticide) sprayed on developing apples to keep them on the trees so that all apples can be picked simultaneously, and to retain the red color of the apples on store shelves. NRDC showed that the U.S. Environmental Protection Agency's cancer risk assessment of Alar failed to consider that cancer initiated in a young child has more years to develop and emerge as cancer. NRDC also noted that children experience a much larger exposure to Alar than had been considered in the adult-based risk assessment, because children eat proportionately more apples and drink more apple juice than adults. This NRDC campaign was based on risk assessment and focused on an outrageously carcinogenic pesticide. It drew considerable media and public attention.

One outcome of the campaign has been a recent U.S. National Research Council report calling for more finely tuned and complicated risk assessments of how much pesticide contamination ("residues") is safe in food that children eat. [8] The Council urges risk assessors to use improved estimates of the diets of infants and children, of the toxic effects of pesticides on infants and children, and of the children's other sources of exposure to pesticides. The report states that "... determinations of safe levels of exposure [to pesticides] should take into consideration the physiological factors that can place infants and children at greater risk of harm than adults." [9]

Do we really need more and better risk assessments for deciding how much of each pesticide active ingredient shall be considered legally "safe" in children's food? Is that where we want to focus years of debate, research, scientific skills, NGO input, and court suits?

Ultimately, children are not protected by better risk assessments of the pesticides that are contaminating their food. Rather, they are best protected by altering the practices of those who use pesticides, including their parents, farmers, foresters, school maintenance staff, and landlords.

Shouldn't we change pesticide dependent practices directly, rather than take the convoluted, scientifically dishonest route of assessing "safe" or "acceptable" exposures to pesticides? Don't we already know that we can grow food without dependence on toxic chemicals? Aren't we better off pursuing campaigns that focus on how to get by with the least amount of pesticides, rather than campaigns that focus on how better to estimate the maximum amount of pesticides that should be permitted in foods that children eat?

We need to focus our campaigns on our real goal: Working and living without pesticides. Pesticide use is an unnecessary, life-destroying activity. Risk assessment arranges deck chairs on the Titanic. Let's refuse to get on board.

Mary O'Brien is staff scientist for the Environmental Research Foundation and President of PANNA's Board of Directors.

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[1] Pesticide ingredients are categorized as "Toxicity 1" automatically by certain triggers, e.g., causing death to 50% of a group of test animals within a short period of time, when fed 50 mg/kg or less of the pesticide. While this is a risk measure, it does not imply that Toxicity 2 or Toxicity 3 pesticides are safe, and categorization as Toxicity 1 can be shown relatively quickly by short-term experiments. The results of these experiments generally do not become subject to "interpretation" via complicated models filled with dubious assumptions (which is a recipe for coming up with a conclusion that there is "safe" exposure).

[2] U.S. Forest Service, Pacific Northwest Region. December 1988. Managing competing and unwanted vegetation. Portland, Oregon.

[3] 40 Code of Federal Regulations, Parts 1500-1508 (1992).

[4] 40 Code of Federal Regulations, Parts 1502.14.

[5] Nicholas Ashford. 1993. The Encouragement of Technological Change for Preventing Chemical Accidents: Moving Firms from Secondary Prevention and Mitigation to Primary Prevention. Cambridge, Massachusetts: Massachusetts Institute of Technology.

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[5] J. Perez de Vega, FAO Field Program Circular, No. 8/92 of December 1992, "Pesticides Selection and Use in Field Project.

[6] FAO, Agriculture: Towards 2010, C93/24, Rome, November 1993.

[7] Ibid.

[8] West European NGO Position Paper for the Bringing Rio Home International NGO Conference, Mulheim, August 31 - September 3, 1993. Available from NEAD, 38-40 Exchange Street, Norwich NR2 1AX. United Kingdom.

[9] Report of UK Conference, Bringing Rio Home, and Response to UK government Consultation Paper, September, 1993. Available from NEAD, as above.

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A Role for the West

China desperately needs pesticide reform. The huge scale of pesticide use and production, and the government and industry monopoly on pesticide information are a deadly combination. Fortunately, the development of environmental consciousness among China's growing middle class, and the increasingly obvious environmental and economic costs of chemical agriculture are creating the basis for a pesticide reform movement.

International environment and development NGOs can support and encourage this process. The most immediate need is for information exchange. Individuals and institutions in China need information on the environmental and health effects of particular pesticides and the practices of transnational corporations that produce them. International NGOs can begin to address this need by translating and disseminating materials, attending conferences, and linking Chinese reformers to the international pesticide reform movement. Most importantly, the international community can provide support and legitimacy to Chinese advocates of less toxic agriculture. As China learns of the growing alternative agriculture movement in the west, pesticides will lose their image of modernity. Of course, information should flow in both directions. The international community could learn a great deal from China about traditional and innovative alternatives to pesticides, particularly in the areas of biological control, intercropping, agroforestry and holistic farm management.[24]

It is extremely difficult for domestic NGOs to form in China, and international groups should be ready to work with governmental institutions, for-profit enterprises, ad hoc groups and others. Only a long-term commitment to building personal relationships with individuals and institutions will yield meaningful results. Working for pesticide reform in China will require patience, creativity and sensitivity, but it can and must be done.

Paul Thiers has made several trips to China in the past 10 years, most recently in September 1993, when he attended a conference on sustainable agriculture and conducted research and interviews for this article. He is currently a graduate student at the University of Oregon studying agricultural politics. He can be reached at 3610 Kincaid St., Eugene, OR 97405, USA; phone (503) 485-4277; email pthiers@darkwing.uoregon.edu.

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PESTICIDE USE IN KENYA

Improper handling of fertilizers and pesticides continues to endanger the lives of Kenya's small-scale farmers and their families, according to a recently released study by Mutuku Mwanthi and Violet Kimani at the University of Nairobi. While Kenya's importation and use of agrochemicals has more than tripled in the last decade, the study showed that the majority of farmers do not handle the hazardous chemicals safely.

Mwanthi and Kimani studied 1,800 households in 10 rural villages in an attempt to determine the magnitude of Kenya's agrochemical-related health problems. All farmers interviewed used chemicals extensively, but only 25% reported taking safety precautions during application. More than 60% of the farmers stored the chemicals in their homes in unmarked containers, despite dangers associated with long-term exposure. When asked to interpret the instructions on a sample label, 60% of literate respondents found the wording to be too technical. The researchers concluded that unsafe storage methods, improper protective clothing and ambiguous instructions contribute to the growing number of Kenya's accidental poisonings.

In response to the study, Mwanthi and Kimani, with community help, initiated an intervention program to promote safe procedures for handling and storing agrochemicals. Suggestions from the community included supplying farm workers with soap and water after spraying, and notifying the public about the dangers of using sprayers for purposes other than their intended chemical use. Community members also requested that manufacturers use straightforward warning labels that incorporate local names for the chemicals.

Sources: Journal of Environmental Health, v. 55, n. 7, pp. 11-16, May 1993.

Contacts: M. Mwanthi, University of Nairobi, College of Health Sciences, Department of Community Health, PO Box 19676, Nairobi, Kenya.

PESTICIDES AND MALE INFERTILITY

A recent study of couples seeking artificial insemination in Austria has shown that long-term exposure to pesticides may affect sperm quality. The study was based on 103 couples who sought artificial insemination with donor sperm as a result of proven poor sperm quality. A control group of couples treated by in-vitro fertilization due to female causes were also studied. Men in each group were questioned about their occupations, and those who were agricultural workers or farmers were questioned further about their exposure to agrochemicals. Researchers also evaluated medical histories, the use of medications, and smoking habits of the participants.

Researchers found that there was a statistically significant number of agricultural workers in the group seeking artificial insemination as opposed to the control group. These workers reported periods of exposure to agrochemicals ranging from 5 to 21 years; the medical histories showed no indications that diseases, long-term medication use or cigarette smoking were related to their infertility.

Source: H. Strohmer, A. Boldizsar, et al. "Agricultural Work and Male Infertility," American Journal of Industrial Medicine, 1993, 24:587-592.

ESTROGENIC PESTICIDES AND BREAST CANCER

On October 21, 1993, The Health and Environment subcommittee of the U.S. House of Representatives Energy and Commerce Committee heard testimony from physicians and scientists suggesting that estrogenic agents, including some pesticides, may be contributing to the rise in the frequency of breast cancer. Pervasive pollutants that possess estrogenic properties include the organochlorine insecticides DDT, endosulfan, kepone and heptachlor; the herbicide atrazine; some petroleum by-products; and polychlorinated biphenyls (PCBs).

Ana Soto, an associate professor at Tufts University School of Medicine in Massachusetts, testified before the subcommittee that endosulfan has estrogenic properties comparable to those of DDT. Recent studies have shown a correlation between blood levels of DDE, a breakdown product of DDT, and breast cancer. (In California alone, over 300,000 pounds of endosulfan were applied in 1991. The U.S. Food and Drug Administration found endosulfan was the seventh most commonly detected pesticide residue in food samples taken between 1986 and 1991.)

Soto conducted tests with human breast cancer cells and found that estrogenic pesticides accelerated the reproduction of breast cells. She suggests that the cumulative effect of exposure to several related organochlorine insecticides could be significant. Currently, the U.S. Environmental Protection Agency's pesticide registration only considers the action of pesticides individually and does not examine synergistic or additive effects. Witnesses testifying before the subcommittee stressed that occupational and dietary exposure to xenoestrogens (chemicals which function as estrogens but are not produced in the body) may explain why some women with no known risk factors for breast cancer contract the disease.

Source: Journal of Pesticide Reform, Winter 1993; Pesticide and Toxic Chemical News, October 27, 1993.

Contact: Northwest Coalition for Alternatives to Pesticides (NCAP), Box 1393, Eugene, OR 97440; phone (503) 344-5044; email ncap@igc.apc.org.

GLOBAL PESTICIDE MARKET REVIEW

The last two years has seen a stagnation in the global agrochemical market. The total value of end-user markets declined in 1992 to US$25,200 million, a decrease of 6% on 1991 sales of US$26,900 million, reflecting a decrease of 2% on the previous year. Agrochemical sales fell heavily in Western Europe, due to weather conditions and reform of the Common Agricultural Policy, while in Eastern Europe pesticide use dropped by as much as 30% as a result of political upheavals.

This decline was not uniform across geographical regions, and pesticide markets in North America, Latin America and East Asia have continued to grow. In East Asia, increased pesticide use occurred in a number of countries regarded as mature markets, Japan, Taiwan and Australia, as well as in developing countries, notably Vietnam, China and Indonesia. The Indian market for pesticides is expanding slowly. Pesticide sales in the Middle East are stable. Africa remains the continent with the lowest use of pesticides due to drought and poverty, and industry expects no increase in sales in the near future.

In Latin America, Brazil remains the major consumer. Brazil is the world's fourth largest pesticide user, after the U.S., Japan and France; however, its 1992 sales dropped by 5% to $1,027 million. Sales are stable in Argentina, but show growth in Colombia and Mexico.

It is noteworthy that Indonesia is considered by industry to be a growing market for pesticides, given the government's commitment to promoting integrated pest management (IPM) in rice production. This policy has

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been an acknowledged success, not only in reducing pesticide use but also in maintaining and, in some cases, increasing yields. The government has saved an estimated US$120 million annually since 1986 following a ban on import of 57 insecticides used on rice.

Sources: Pesticides News 22, December 1993; Chemistry & Industry, November 15, 1993; Michael Hansen, Sustainable Agriculture and Rural Development: FAO at the Crossroads, Consumer Policy Institute/Consumers Union/PAN, 1993; Agrow's Top 25, September 1993; Agrow, July 23, 1993.

Contact: Barbara Dinham, The Pesticides Trust, see back cover.

POLAND LEGISLATES TO PROTECT ITSELF AGAINST HAZARDOUS PESTICIDE TRADE

Poland has taken steps to protect itself from becoming a dumping ground for the industrial world's expired and withdrawn products after extremely hazardous, banned pesticides produced in Germany were found in Poland. The new prohibition on imports of hazardous products is part of broader legislation to control the import of toxic wastes.

On August 3, 1993, the Polish Minister of Environmental Protection, Natural Resources and Forestry issued a list of hazardous waste forbidden for import and export. This list came into force on September 3, 1993. It consists of 106 categories of waste that are forbidden for import into Poland, including 10 categories of hazardous products such as withdrawn pesticides. The list also includes expired or withdrawn pharmaceutical products, cosmetics, wood preserving chemicals, lacquers and varnishes.

In 1988, Poland opened its borders to the world. The country's proximity to some of the world's most highly industrialized nations — countries that also have vigorous environmental movements — made Poland a key target for the dumping of industrial wastes as well as outdated and withdrawn products.

In 1989, Poland introduced a ban on all waste trade imports. However this law was unclear, and waste continued to be imported under the guise of "recycling" including waste solvents, paints, incinerator residues, sewage sludge and dredged spoils from rivers.

When East and West Germany unified on October 3, 1990, a number of industrial substances, produced in the former German Democratic Republic (GDR) became illegal overnight. These included pesticides banned under European Community (EC) and West German law. Instead of being categorized as hazardous waste and treated as such in Germany, many of the banned pesticides were shipped to the newly opened Eastern European countries. In July 1991, 36,000 liters and 12,000 kilograms of Falisan, a mercury-containing pesticide produced by an ex-GDR manufacturer which could no longer be sold in the new unified Germany, were found in Poland. Under a "return to sender" agreement between Germany and Poland, the Polish government sent the illegal pesticides back to Germany.

Poland's legislation could provide an effective barrier to hazardous waste and product imports if it were not for the fact that it is extremely difficult to monitor and control imports at the border. While Poland's new regulations are a useful model for countries vulnerable to toxic waste from industrialized countries, these regulations do not solve all the problems; responsibility also clearly lies with industrialized nations to put an end to production and export of toxic waste and withdrawn products.

Source: Greenpeace International.; Polish Government, 1993; Rzeczpospolita, August 30, 1993.

Contact: Topsy Jewell, Greenpeace Intl., 12 St. Johns Terrace, Lewes, East Sussex BN7 2DL, England; phone (44-273) 479 552; fax (44-273) 471 631.

POTATO BLIGHT

A new and more virulent form of late bight fungus (*Phytophthora infestans*), the blight that triggered the Irish Potato Famine of the 1840s, is threatening potato crops around the world. According to the Consultative Group on International Agricultural Research, the late blight fungus originated in Mexico and is spreading to other countries through "improved" potato seeds developed in Europe from contaminated Mexican potatoes. Dr. Huber Zandstra, Director of the International Potato Centre in Peru, is calling for emergency breeding programs to create blight resistant potatoes. According to Dr. Znadstra, the new blight jeopardizes current international efforts to reduce the amount of agrochemicals on potatoes.

Because of high vulnerability to insect pests, fungi, virus and bacterial disease, more agricultural chemicals are used on potatoes than any other food crop. Globally, potato farmers spend an estimated US$1.5 billion on fungicides and insecticides to control major pests and diseases. Developing countries now produce nearly one-third of the world's potato crop, which, next to wheat, is the fastest growing staple crop in the developing world.

Source: RAFI Communique, December 1993 and September/October 1992.

Contact: Rural Advancement Foundation International (RAFI), Suite 504, 71 Bank St., Ottawa, Ontario K1P 5N2, Canada; phone (613) 567-6880; fax (613) 567-6884; email rafican@igc.apc.org.

PESTICIDES CAUSE MASSIVE BIRD KILLS IN BRAZIL

Millions of birds have been poisoned in furadan-treated wheat fields in the southern Brazilian state of Santa Catarina, according to reports by PAN Brazil and the Union of Rural Workers of Vargeao.

Furadan, the trade name for granulated carbofuran produced in Brazil by NORAGRO, is a long-lasting insecticide-nematicide that is applied when seeds are planted to control pests that may or may not occur later in the growing season. A single application has a prolonged action of up to 30 days. According to U.S. Environmental Protection Agency data, carbofuran has been responsible for killing thousands of birds from bald eagles in the Chesapeake Bay to Canada geese in California's central valley; a single granule is capable of killing a small bird.

Carbofuran is also marketed in Brazil by EPAGRI de Vargeao-SC under the trade name Ralzer, and applied by a specialized Sao Paulo based company. According to Geraldo Luiz Rozanski, an agronomist with the Union of Rural Workers, runoff from farmland treated by this company has contaminated large areas and abnormally large bird kills have been reported throughout the watershed.

PAN Brazil and the Union have sent urgent messages to the Governor of Santa Catarina (who was formerly the Secretary of Agriculture) and the Public Ministry of the district, which promised to open a public inquiry on the ecological disaster, but to date no results have been forthcoming. The lax government response outraged the local farmers.

One local farmer summed up the preferential treatment received by big companies, noting that when a local hunter is caught killing birds, his gun will be confiscated and he faces the possibility of going to jail; but when

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PAN NEWS & COMPUTER NETWORKING

Many of these news notes are available electronically by computer network as part of our Pesticide Action Network North America Updates Service (PANUPS)—an on-line electronic pesticide-related news service. Updates are posted weekly on the appropriate Association for Progressive Communications (APC) electronic conferences and distributed worldwide through APC member networks. PANUPS is also posted in the Public Conference on RTK NET, on GeoNet in the PESTICIDES-BBS bulletin board, on the EcoNet echo on FidoNet, on the Sustainable Agriculture Network (SANET) on BitNet, and on PENpages agriculture information service at Penn State University. Bi-monthly hard-copy compilations are also available. For more information, contact PANNA.
You can contact PANNA by e-mail at "panna@igc.apc.org".

EPAGRI and NORAGRO kill birds indiscriminately during the mating season and poison the environment at the same time, nothing happens.

Sources: INFOPAN Oct.-Dec. 1993, published by PAN Brazil. US EPA Pesticide Fact Sheet, Office of Pesticides and Toxic Substances, Office of Pesticide Programs, US EPA, Washington, DC, 20460.

Contact: PAN Brazil, C. Postal 947, Joinville - Brasil, Cep 89.201-972; phone (55-474) 224 874; fax (55-474) 260 649.

RIGHT-TO-KNOW WINS OVER DUPONT CONFIDENTIALITY CLAIM

On January 26th, 1994, a Florida judge lifted a confidentiality agreement that would have sealed 150,000 documents from cases alleging that Du Pont's fungicide Benlate DF, a benomyl fungicide, caused extensive crop damage. Documents ordered released include internal Du Pont memos and scientific reports on Benlate, which is alleged to have caused hundreds of millions of dollars in damages to crop and nursery plants in the 1980s. It was removed from the market in 1991.

The Florida Department of Agriculture filed the motion to release the documents over a year ago under the state's "Sunshine Act." After three separate hearings to determine the constitutionality of the act and its applicability to the Benlate case, the judge ruled that benlate is indeed a "public harm" as defined by the act, and ordered the documents released.

Florida juries have found Du Pont liable in four recent 1993 cases, awarding between $500,000 and $2 million to tomato, fern and orchid growers claiming Benlate-related crop damage. In August, an Arkansas jury hit Du Pont with $3 million in punitive damages on top of $9 million in compensatory damages awarded to growers. (Punitive damages were not requested in the Florida cases.) Du Pont has also paid upwards of $500 million in out-of-court settlements; hundreds of similar suits are still pending around the country.

Last December growers were given another persuasive piece of evidence when a Florida Department of Agriculture scientist reported that in his studies, plants treated with Benlate DF exhibited stunted growth, mutated leaves, and immature root systems, supporting the growers' experiences of Benlate phytotoxicity.

In addition to plant damage, numerous health problems have been reported by growers exposed to Benlate DF, including skin rashes, respiratory problems and cancers. A broad coalition of farmworker, grower, consumer and environmental organizations led by a group called Benlate Victims Against Du Pont, as well as Florida's Pesticide Review Council, continue to investigate the reports.

Du Pont's liability is likely not limited to the U.S. cases. Health problems and plant damage related to Benlate have been reported in Costa Rica, Jamaica, Thailand and the Philippines. Benomyl fungicides are widely used in specialty crops such as ornamental plants, fruits and vegetables, and field crops, especially rice, around the world. Florida Defenders of the Environment is investigating international cases of both plant damage and human health problems related to Benlate.

For more information, or to report incidences of Benlate damage, please contact: Kerry Dressler, Director of the Toxics Project for Florida Defenders of the Environment. Route 2, Box 565C, Micopany, FL 32667; phone/fax (904) 466-4215.

Additional contact: Benlate Victims Against Du Pont, 17000 SW, 284th Street, Homestead, FL 33030; phone: (305) 246-8627.

PESTICIDES THREATEN HEALTH AND ENVIRONMENT IN THE PACIFIC

Pesticide contamination threatens human health and the extremely vulnerable ecosystems of the South Pacific, according to a report by Meriel Watts of Greenpeace's Pacific Campaign. The report, *Poisons in Paradise: Pesticides in the Pacific*, was released by Greenpeace in collaboration with PAN Asia and the Pacific (PAN AP). The report finds that 57 pesticides that are banned or not registered in other countries are widely available in the 22 South Pacific Commission nations, including many of the pesticides targeted by PAN's "Dirty Dozen" campaign.

Pesticide use and runoff are destroying the fragile coral reefs, mangrove swamps, and seagrass beds which provide habitats for fish and help control coastline erosion. Recent groundwater analysis revealed residues of paraquat, lindane and 2,4-D in Guam groundwater, and traces of the DDT metabolite, DDE, in Tonga groundwater.

Small island ecosystems are particularly vulnerable to environmental hazards including pesticide contamination because of limited arable land and water supplies. The environmental conditions on the Pacific islands are markedly different from the conditions on large land masses, rendering outside environmental abuse studies largely inapplicable.

The report also finds that the incidence of human pesticide poisoning is much higher in the Pacific region than in Australia and New Zealand, despite these countries' larger populations and greater use of agrochemicals. From 1970-1984, the total number of recorded deaths from pesticides was 45 in Papua New Guinea, and 210 in Western Samoa, compared to 15 deaths in Australia from 1971-1980.

In response to these health and environmental problems, the report recommends public education campaigns on the hazards of pesticides and education of doctors and health workers in the recognition and treatment of poisonings. Greenpeace also urges governments to withdraw registration of pesticides with inadequate data for determining their ecological effects, to adopt phase-out programs, and to create systems of sustainable agriculture. Greenpeace also advises South Pacific nations to implement the "precautionary principle," which states that the most effective method to end human and

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environmental pesticide contamination is to avoid using these dangerous chemicals.

Source: Meriel Watts, "Poisons in Paradise: Pesticides in the Pacific," Greenpeace Pacific Campaign, PAN AP, October 1993.

Contacts: Pesticide Action Network Asia & the Pacific, see back cover. Greenpeace Pacific Campaign, 22 York Street, Parnell, PO Box 90257, Wellesley Street, Auckland, New Zealand; phone (64-9) 337-76128; fax (64-9) 303-2676.

PESTICIDES ON EUROPEAN BEACHES

In December 1993, government workers in France reported that they had picked up more than 7,000 plastic bags of pesticides that had fallen off a French vessel, the *Sherbro*, earlier that month. The freighter, carrying a cargo of pesticides and other toxic chemicals, lost 88 containers in a storm. The bags that washed ashore contained Apron Plus DS (metalaxyl), a fungicide made by Ciba-Geigy. During the same period, thousands of dangerous explosive devices as well as over 60 barrels of flammable acetone washed ashore, prompting the French government to close beaches from its border with Belgium down to Spain.

By late January, thousands of the packets containing the fungicide had washed up on the beaches along the Netherlands' North Sea coast. Police in the Netherlands sealed off more than 62 miles of beaches while cleanup workers combed sand dunes for the cigarette pack-sized pesticide containers. Hundreds of the packets were still drifting towards five German islands in the North Sea.

The *Sherbro* was impounded by Dutch authorities but allowed to leave Amsterdam after the owner's insurer paid a US$2.5 million guarantee for clean-up costs. Ministers from the states adjoining the North Sea, Britain, Denmark, the Netherlands, France, Belgium and Germany, planned an urgent meeting in Paris to discuss what lessons could be learned from the accident. Germany plans to propose that dangerous or toxic cargoes be limited to specific routes, and that such cargo be carried below deck. The cargo of pesticides on board the *Sherbo* was carried in containers stacked on deck which fell off in heavy seas.

Source: New York Times, December 28, 1993; Greenpeace France; Reuter January 20, January 23 and January 24, 1994; AP January 20, 1994.

Contact: PAN Germany, Gauss-Str.17, 22765 Hamburg, Germany; phone (49-40) 39 39 78; fax (49-40) 390 75 20; email pan-germany@umwelt.zer

MULHEIM CONFERENCE: BRINGING RIO HOME

Approximately 100 delegates from almost every region of the world attended an international NGO conference on sustainable agriculture, "Bringing Rio Home," in Mulheim, Germany, August 31 - September 3, 1993. They met to build on progress made at the Earth Summit and at various local, national and regional meetings, and to reach consensus on policy actions they could work toward either independently or collaboratively. The Mulheim Declaration on Sustainable Agriculture, available in English, Spanish, and French, calls for a meaningful sustainable agriculture and rural development approach "founded on democratic principles that recognize the important role of people-oriented models which promote labor intensive approaches and the use of appropriate technology."

The focus of the conference was not to define "the problem" or "the vision" but to see if people from very different parts of the world could agree on policy actions. Participants noted that Chapter 14 of Agenda 21 addresses sustainable agriculture and rural development through primarily technical issues of food production without looking at the wider forces affecting agricultural sustainability. In contrast, discussion at the Mulheim conference focused on issues of trade, transnational corporations and policies of international institutions.

The Mulheim Declaration outlines the positions that were agreed upon by conference participants. These include:

- a transition from the current conventional model to sustainable agriculture through a consultative, participatory process to ensure human survival;
- agricultural trade policy which recognizes social, cultural, family and religious values associated with agriculture;
- structural adjustment and multilateral development bank programs that place priority on agricultural production linked with local needs and markets;
- government actions that promote land tenure and family farm holding, in both "developed" and "developing" countries;
- developing biodiversity and biotechnology guidelines that consider genetic resources as common human heritage.

The delegates also agreed upon a list of 13 actions to be undertaken by NGOs, including: ending production and trade of banned and unregistered pesticides; freely exchanging among nations all information on the potential hazardous impacts of pesticides; and making pesticide laws comply, at a minimum, with the FAO Code of Conduct.

Contact: Rudi Buntzel (conference organizer), Protestant Farmers' Association of Wurttemberg Hohebuch D-74638 Waldenburg, Germany tel: (49) 7942/107-74, -76 fax: (49) 7942/107-77 email: ebw@link-cr.comlink.apc.org.

Linda Elswick, World Sustainable Agriculture Association 1331 Pennsylvania Avenue, Suite 907 North Washington, DC 20004; phone (202) 347-0637; fax (202) 347-0654; email wsaadc@cdp.apc.org.

ACRONYMS USED IN THIS ISSUE

CEA	Chinese Ecological Agriculture
CSD	United Nations Conference on Sustainable Development
EPA	U.S. Environmental Protection Agency
FAO	Food and Agriculture Organization of the United Nations
FDA	U.S. Food and Drug Administration
IPM	Integrated pest management
GATT	General Agreement on Trade and Tariffs
MBAN	Methyl Bromide Alternatives Network
MBTOC	Methyl Bromide Technical Options Committee
NAFTA	North American Free Trade Agreement
NEPA	U.S. National Environmental Policy Act
NGO	Nongovernmental organization
NRDC	Natural Resources Defense Council (U.S.)
PAN	Pesticide Action Network
SAFE	Sustainable Agriculture Food and the Environment (U.K.)
SARD	Sustainable agriculture and rural development
SPS	Sanitary and Phytosanitary
TNC	Transnational corporation
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
USDA	U.S. Department of Agriculture

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The New Protectionism: Protecting the Future Against Free Trade, 1993. Tim Lang and Colin Hines. Analyzes the powers behind the free trade argument and describes a "new Protectionism" to reduce external trade while protecting and promoting local interests. US$11.95. The New Press, 450 West 41st Street, New York, NY 10036; phone (212) 629-8802; fax (212) 268-6349.

Agricultural Policy and Sustainability: Case Studies from India, Chile, the Philippines and the United States, 1993. World Resources Institute. Examines how farm policies affect farmers' production choices which in tum affect the environment and human health. US$14.95. World Resources Institute, 1709 New York Ave, NW, Washington, DC 20006; phone (800) 822-0504; fax (202) 638-0036; email pfaeth@wri.org.

The Challenge of Cross-Border Environmentalism, 1993. Tom Barry and Beth Sims. Explores the impacts of environmental issues facing U.S.-Mexico borderlands including: cross-border water contamination, pesticides, maquiladora wastes, and free trade. US$9.95. Resource Center Press, Box 4506, Albuquerque, NM 87196, USA; phone (505) 842-8288; fax (505) 246-1601.

Playing With Poison, 1993. Keshab Kandel and Mohan Mainali. Lists pesticides available in Nepal and pesticide disposal problems in that country. NEFEJ Pesticides Watch, Nepal Forum of Environmental Journalists, P.O. Box 5143, Thapathali, Kathmandu, Nepal; phone (977-1) 227691; fax (977-1) 226820.

The Case Against Free Trade: GATT, NAFTA, and the Globalization of Corporate Power, 1993. Essays by leading citizen-oriented trade experts including Mark Ritchie, Vendana Shiva, Lori Wallach and Ralph Nader. US$10. Available in bookstores. Earth Island Press, 300 Broadway, San Francisco, CA 94133.

Pesticides and Health of Women: Selected References, 1993. Dr. Marion Moses. Bibliography of selected journal articles including cancer in adults, breast milk contamination, reproductive toxicity, exposure, and cancer in children. US$1.50 and self addressed envelope. Pesticide Education Center, P.O. Box 420870, San Francisco, CA 94142-0870; phone (415) 391-8511; fax (415) 391-9159.

Pest Control in the School Environment: Adopting Integrated Pest Management, 1993. EPA. Booklet designed to encourage schools to examine and improve pest management practices by implementing an Integrated Pest Management (IPM) plan. For orders up to 10 copies: Public Information Center (3404), U.S. EPA, 401 M Street SW, Washington, DC 20460.

Pesticides and Health in the Americas, 1993. Samuel Henao, et. al. Report summarizes epidemiological and other pesticide-related studies conducted in North and South America. English and Spanish. Dr. Henk de Koning, Division of Health and Environment, Pan American Health Organization, 525 23rd Street, NW, Washington, DC 20037-2895; phone (202) 861-3200; fax (202) 861-8462.

Seeds of Change: The Living Treasure, 1994. Kenny Ausubel. Author's perception of the loss of genetic plant diversity and how a handful of seed collectors successfully collected and spread a variety of native and exotic organic seeds world wide through public sales. US$18. Harper Collins, 10 East 53rd Street, New York, NY 10022.

Status of Pesticides in Reregistration and Special Review: Rainbow Report, 1993. EPA. Pesticides undergoing the Special Review Process or the reregistration process mandated by FIFRA '88. Rainbow Report, Special Review and Reregistration Division (H-7508W), Office of Pesticide Programs, U.S. EPA, Washington, DC 20460; phone (703) 308-8000; fax (703) 308-8005.

Profits From Poison, 1989. The Better World Society and Central Television/U.K. and The Television Trust for the Environment. VHS video features Thailand and the Philippines as examples of developing countries facing problems of pesticide abuse, and shows available alternatives. Purchase US$295 (US$99.95 + $5 shipping for non-profits), rental US$90. The Cinema Guild, 1697 Broadway, New York, NY 10019, USA; phone (212) 246-5522; fax (212) 246-5525.

Food and Drug Administration Pesticide Program: Residue Monitoring, 1992. FDA. Summarizes results of the FDA's residue monitoring program. Free. Norma Yess, c/o Food and Drug Administration, 200 C Street, SW, HFS-308, Washington, DC 20204; phone (202) 205-4152; fax (202) 205-4422.

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PAN BOOKS AND REPORTS

Demise of the Dirty Dozen. 1993. PAN North America Regional Center. Chart shows for 78 countries where Dirty Dozen pesticides are banned, severely restricted or unregistered. Includes resource list and action ideas. US$3. Also available: chart background information and source material. US$5.

Dirty Dozen Fact Sheets. 1990. Summarizes health and environmental effects of the Dirty Dozen pesticides. PAN North America Regional Center. 32 pp. Also available in Spanish, Arabic, and Mandarin. US$5.

Into the Sunlight: Exposing Methyl Bromide's Threat to the Ozone Layer. 1992. Friends of the Earth, et al (including PAN North America). Report discusses the impact of methyl bromide on the ozone layer, current information on methyl bromide uses, alternatives and action ideas. 54 pp. US$10 (Shipping add US$2).

The Pesticide Handbook: Profiles For Action, 3rd Edition. 1991. Karen Snyder and Sarojini Rengam. Contains essential information on pesticide abuse and profiles 44 hazardous pesticides. International Organization of Consumers Unions. 413 pp. US$20 (Shipping add US$2.50).

The Pesticide Hazard: A Global Health and Environmental Audit. 1993. Barbara Dinham. Global survey of safety and environmental policy since the adoption of the FAO Code of Conduct of the Distribution and Use of Pesticides, with a focus on the developing world. Includes case reports from 13 countries. The Pesticides Trust. 228 pp. US$19.95. (Shipping add US$2.50).

Pesticide Use Reduction Policies in Europe. 1993. Doreen Stabinsky. Brief overview of policies to reduce pesticide use in Sweden, Denmark and the Netherlands. 6 pp. US$4.

Pesticide Use Reduction in California: A Synthesis Report. 1993. Doreen Stabinsky. A report on PANNA's California pesticide use reduction project including a draft pesticide use reduction plan for the state. 16 pp. US$6.

Prospering Without Methyl Bromide: A Critique of USDA's Analysis of a Methyl Bromide Ban. 1994. Will Rostov and Anne Schonfield. Critiques U.S. Department of Agriculture's analysis of the economic impacts of a methyl bromide ban and the failure of the USDA to consider feasible alternatives. 16 pp. US$5.

Sustainable Agriculture and Rural Development: FAO at the Crossroads. 1993. Michael Hansen. Consumer Policy Institute/ Consumers Union/PAN. An examination of FAO policies related to sustainable agriculture and rural development and recommendations for successful implementation. US$10.

Victims Without Voice: A Study of Women Pesticide Workers in Malaysia. 1992. Vasanthi Arumugam. Studies the impact of pesticides on women plantation workers in Malaysia. Includes in-depth interviews with 50 women pesticide sprayers. 192 pp. US$10 (Shipping add US$1.50).

Contact PANNA for a complete list of publications.

AFFILIATE WITH PAN!

PAN North America has over 75 affiliates in Canada, Mexico and the U.S. The affiliates are non-profit and volunteer groups who collaborate with PANNA in campaigns throughout North America and the world. All affiliates receive both the ***Global Pesticide Campaigner*** and hard-copy compilations of **PANUPS**, the Pesticide Action Network North America Updates Service. Affiliates also receive other benefits including discounts on information services – plus the satisfaction of joining forces with a global network of activists.

The rates are $50/year ($30/year for all-volunteer groups). See the subscription form in this issue, and fill in the "Organization Affiliation" box, or contact PANNA for more information.

Pesticide Action Network

PAN is an international coalition of grassroots organizations who oppose the misuse of pesticides and support reliance on safe, ecologically sound alternatives. Established in 1982, PAN currently links over 300 organizations in some 60 countries, coordinated by six Regional Centers. For more information, contact the PAN Regional Center nearest you.

AFRICA (Anglophone)

Environment Liaison Centre International
P.O. Box 72461
Nairobi, Kenya
Tel: (254-2) 562015
Fax: (254-2) 562175
Telex: 23240 ELC KE
Email: elcidwr@gn.apc.org

AFRICA (Francophone)

Environnement et Developpement du Tiers Monde
B.P. 3370
Dakar, Senegal
Tel: (221) 224229
Fax: (221) 222695
Telex: 51456 ENDA TM SG
Email: Abou_Thiam@f1.n7711.z5.gnfido.fidonet.org

ASIA/PACIFIC

PAN Asia and the Pacific
P.O. Box 1170
10850 Penang, Malaysia
Tel: (60-4) 870271
Fax: (60-4) 877445
Email: panap@peg.apc.ort

EUROPE

PAN Europe
c/o Pesticides Trust
23 Beehive Place
London SW9 7QR, England
Tel: (44-71) 274-9086
Fax: (44-71) 274-9084
Email: pesttrust@gn.apc.org

LATIN AMERICA

RAPALMIRA
Apartado Aéreo 1440
Palmira (Valle)
Colombia
Phone: (57-227) 735 455
Fax: (57-227) 757115

NORTH AMERICA

PAN North America Regional Center
116 New Montgomery Street, #810
San Francisco, CA 94105, U.S.A.
Phone: (415) 541-9140
Fax: (415) 541-9253
Email: panna@igc.apc.org

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