Global Pesticide Campaigner

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Sustainable Agriculture: The Cuban Experiment

*by Global Exchange Delegation Members**

As members of a recent scientific delegation to Cuba, many of us began our mission believing that the Cuban government's claims of large-scale development and application of sustainable agriculture were more fantasy than fact. What we experienced over the course of our travels was quite the opposite — the country has embarked on a nationwide program to transform their agricultural production from conventional to sustainable systems.

Our delegation traveled to Cuba in November 1992, visiting agricultural research and extension centers, and state, cooperative, and private farms. The group of 20 included scientists from the U.S., Puerto Rico, Mexico, and Nicaragua, along with farmers and activists from the U.S. The delegation was organized by Global Exchange and led by Dr. Peter Rosset of Stanford University. Eighteen members of the delegation produced the report *Two Steps Backward, One Step Forward: Cuba's Nationwide Experiment with Organic Agriculture*. This article includes excerpts from the report as well as additional information and analysis.

Cuban Agriculture in Perspective

From the Cuban revolution in 1959 through the collapse of trading relations with the socialist bloc at the end of the 1980s, Cuba's economic development was characterized by rapid modernization, a high degree of social welfare, and strong external dependency. While most physical quality of life indicators were high, Cuba depended upon its socialist trading partners for petroleum,

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Control of Cotton: The Patenting of Transgenic Cotton

by Hope Shand

While the proponents of biotechnology often emphasize possible benefits such as reducing the use of pesticides, less attention has focused on the potentially negative environmental, social and economic impacts. One of the most overlooked but possibly the most disturbing aspects of emerging biotechnologies involves patenting and intellectual property rights.

On October 27, 1992, Agracetus, Inc. received U.S. Patent No. 5,159,135 which covers all varieties of genetically engineered cotton. The exceptionally broad scope of this industrial patent is unprecedented in plant biotechnology, giving the company monopoly control over all transgenic cotton plants and seeds until the year 2008. It is the first reported case where one patent covers all genetically engineered plants of an entire species and two of the major techniques used to transform them as well.

In the United States, Agracetus (a subsidiary of W.R. Grace & Co.) now has the right to decide if and when to license its technology, and under what conditions. According to Agracetus' Vice-President of Finance, Russell Smestad, "All transgenic cotton products, regardless of which engineering technique is used, will have to be commercially licensed through us before they can enter the marketplace."[1]

The potential impact of Agracetus' patent is not limited to the United States. Agracetus also has patents pending in the European Patent Office, Brazil, China and India. Together, the United States, Brazil, China and India currently account for 60% of global cotton production.[2] The U.S. patent represents a dangerous and disturbing precedent for all biotechnology-related intellectual property rights worldwide.

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PAN is an international coalition of citizens' groups and individuals who oppose the misuse of pesticides and support reliance on safe, sustainable pest control methods. 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.

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The First Word

by Monica Moore

In late June 1993, for the first time in U.S. policy history, the Clinton Administration made the link between toxic source reduction and farming, announcing an inter-agency "commitment to reducing the use of pesticides and to promote sustainable agriculture." Many environmental, farm worker advocate, and sustainable agriculture organizations welcomed the statement as a significant break with past policy, and urged adoption of aggressive programs to dramatically reduce the approximately one billion pounds of pesticides used in the U.S. each year. Unfortunately and perhaps predictably, the Administration's actual proposed legislative package released in September revealed that celebrating a new era of pesticide reform in the U.S. is premature, to say the least.

While promising a "health-based standard" — defined as "a reasonable certainty of no harm to consumers of food" — the Clinton proposal pivots on sacking the 30 year old Delaney Clause of the Federal Food Drug and Cosmetic Act, which outlaws introduction of cancer causing residues into processed foods. The only public health, disease prevention-based regulation now codified in U.S. pesticide law, the Delaney Clause has long been targeted for elimination by the chemical industry and agribusiness (who are currently sponsoring their own legislation to repeal the Delaney Clause). Rather than extend the clause's precautionary approach to encompass all food and non-food pesticide use and prevent other health effects associated with pesticides, the Administration proposes to trade it off for a "negligible risk" standard. This standard would establish "acceptable" levels of cancer in the U.S. population (and given exports, in other countries as well), based on highly questionable risk assessment techniques.

The Clinton proposal does contain measures likely to encourage, if not ensure, some reductions in pesticide use, e.g. increasing the number of farms using Integrated Pest Management (athough what this means is left undefined); amending Environmental Protection Agency procedures to expedite removal of pesticides from the market; and a limited "Circle of Poison" provision that would adopt Prior Informed Consent into national law and prohibit export of some unregistered pesticides. The impacts of other proposed measures, including easing test requirements and extending exclusive marketing rights for registrants of "safer" pesticides, are far more dubious.

Such weaknesses, and especially the proposed "negligible risk" standard, unnecessarily compromise public and environmental health. In spite of policy makers' attempts to mask their political and moral choices as science-based, "negligible risk" is neither good science nor an acceptable foundation for pesticide use reduction policy. It also puts the Administration on a collision course with a public increasingly unwilling to accept government-approved exposures to products that cause cancer and a wide range of other diseases. Examples of more successful approaches to pesticide use reduction can be found in fields of innovative farmers, and in policies of many countries around the world; the U.S. government can and must do better than "negligible risk."

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

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EIGHT YEARS LATER, INDUSTRY ADVERTISING STILL VIOLATES FAO CODE

by Peg Stevenson

In a rural village somewhere in Malaysia, dozens of palm trees shade a neat wooden home. The clearing before the front door is thick with green grasses and presided over by a bronze rooster. Butterflies, honeybees and tropical birds sail among the trees and flowering plants. A banana grove near the house waves broad green leaves and bunches of bright fruit await harvest. The scene is idyllic, full of life, and made possible by ... paraquat? So suggests ICI's headline for this advertisement: "Paraquat and Nature working in perfect Harmony," which appeared April 15, 1993, in the *Malay Mail*. (It has since been withdrawn.)

In 1985, ICI and many other pesticide companies agreed to abide by the U.N. Food and Agriculture Organization's International Code of Conduct on the Distribution and Use of Pesticides (the FAO Code). That code prohibits pesticide advertising that is misleading, misuses scientific jargon, or makes unsubstantiated guarantees. That code requires that ads draw attention to safety warnings. That code demands that chemical company advertising respect the reality of agricultural working conditions in the Third World.

Yet ICI's paraquat ad is a parody of the commitments made by the pesticide industry, and a measure of the disparity between the principles it accepted in 1985 and corporate practice. This single ad alone violates half of the provisions of Article 11 of the FAO Code, which sets out advertising guidelines for the pesticide industry.

Section 1.1 Industry should ensure that: all statements used in advertising are capable of technical substantiation.

Section 1.2 [Industry should ensure that:] advertisements do not contain any statement or visual presentation which, directly or by implication, omission, ambiguity or exaggerated claim, is likely to mislead the buyer, in particular with regard to the safety of the product, its nature, composition or suitability for use, or official recognition or approval.

The "perfect harmony" promised by ICI is hardly an accurate claim or one that can be technically substantiated. Paraquat, one of PAN's "Dirty Dozen" pesticides, is extremely toxic to mammals and has a long history of occupational health problems and fatal poisonings. Chronic low-level contact with paraquat can cause burns, rashes, intestinal illness and permanent damage to the lungs, liver and kidneys.[1] Ingesting about a spoonful of paraquat or absorbing it through broken skin can be fatal, and there is no effective antidote for severe paraquat poisoning.[2] The Malaysian Department of Chemistry reports that from 1978 to 1985, paraquat poisoning killed more than 450 people in Malaysia — many of

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them suicides. Paraquat poisoning is responsible for hundreds of accidental deaths, suicides and illnesses annually in Japan, Papua New Guinea, Costa Rica and other nations around the globe.

Section 1.7 [Industry should ensure that:] advertisements do not misuse research results or quotations from technical and scientific literature; and scientific jargon and irrelevances are not used to make claims appear to have a scientific basis they do not possess.

Is ICI's language a "misuse of research results" or "scientific jargon?" In paragraph two of the ad, ICI says that paraquat is adsorbed to soil and deactivated rapidly. While it is true that paraquat binds tightly to soil particles, this slows it from breaking down and increases paraquat's persistence in the environment.[3] ICI characterizes this dynamic as making paraquat "biologically unavailable." However, other studies have found that paraquat bound to soil particles can be carried into water or made airborne as dust, where it may be ingested or inhaled by humans or animals. Additionally, one of paraquat's degradates, QINA, is only loosely adsorbed to soil, and therefore is a potential groundwater contaminant.[4]

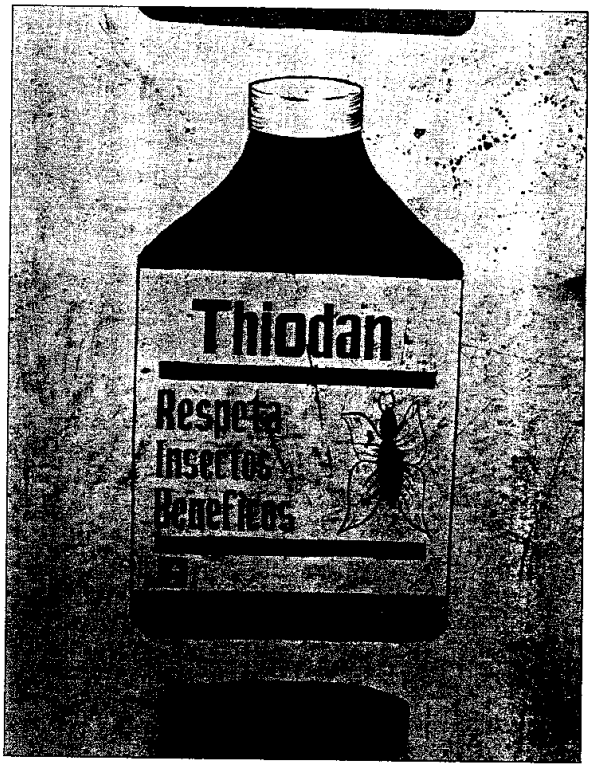

photo by Monica Moore

Ad painted on door in village near Quetzaltenango, Guatemala, 1992.

Section 1.8 [Industry should ensure that:] claims as to safety, including statements such as "safe," "non-poisonous," "harmless," "non-toxic," are not made with or without a qualifying phrase such as "when used as directed."

ICI's "environmentally friendly" product, described in the ad as "not harmful to wildlife," has been shown to have acute or chronic effects on frogs, fish, mice, birds, horses, bees and other insects. The World Health Organization has recommended that all domestic animals be kept far from areas sprayed with paraquat.[5]

Section 1.10 [Industry should ensure that:] misleading statements are not made concerning the effectiveness of the product.

Section 1.11 [Industry should ensure that:] no guarantees or implied guarantees — e.g. "more profits with ..." or "guarantees high yields" — are given unless definite evidence to substantiate such claims is available.

ICI's paraquat ad promises "variety and abundance of food," in addition to other benefits for the farm such as "increased organic matter which improves soil tilth and fertility." A 1981 study showed that paraquat had a negative impact on nitrogen fixing soil rhizhobial species associated with alfalfa. In 1984, an Indian scientist observed a powerful mutagenic effect of paraquat on nitrogen fixing blue-green algae found in rice paddies. These studies raise concerns about nitrogen fertility management from non-chemical sources in some agricultural cropping systems.[6]

Section 1.13 [Industry should ensure that:] advertising or promotional material draws attention to the appropriate warning phrases and symbols as laid down in the labelling guidelines.

Section 1.17 [Industry should ensure that:] advertisements encourage purchasers and users to read the label carefully, or have the label read to them if they cannot read.

ICI's ad is also in violation of the FAO Code for what it leaves out. Neither of the two critical safety provisions mentioned above is present in the paraquat ad. Such omissions point directly to the large gap between the spirit of the FAO Code and the practice of ICI's paraquat marketing in developing countries.

Absent effective national or international enforcement mechanisms, the FAO Code places responsibility on industry to follow products in the marketplace, including training vendors and users, and insuring that safety equipment is also available where pesticides are sold. Further, where safety equipment is unavailable or impractical, the Code states that pesticides that therefore cannot be used safely should not be sold.[7] Nowhere does ICI's ad campaign point out that paraquat should be used with safety equipment including gloves, suits, and respirators — items that are both unavailable and impractical for many Malaysian agricultural workers.

ICI is certainly not the only pesticide company whose advertisements continue to violate the FAO Code. The ad pictured on this page is painted on the door of a Hoechst distributor in a small village outside of Quetzaltenango, Guatemala. It is typical of pesticide advertising placed on shops, billboards, fences and structures throughout the Third World.

This ad, with its picture of a smiling butterfly, promotes Hoescht's endosulfan insecticide Thiodan as a product that "respects beneficial insects." This claim and picture are both "exaggerated" and "misleading" in violation of the FAO Code. While endosulfan is less toxic to honeybees and other beneficial insects than some other pesticides, it proved highly toxic to a number of beneficial insects in a 1983 study of 40 pesticides by the International Organization for Biological Control (IOBC). The IOBC rated endosulfan (Thiodan 35 Spritzpulver) in its most toxic category (greater than 99% mortality) for seven of nine beneficial arthropods tested.[8] Endosulfan is also highly toxic to fish and

aquatic organisms, and to some birds and wildlife.[9]

Moreover, without so much as a symbol for toxicity or danger, let alone explicit cautions, this ad conveys no information on health risks or use and storage precautions. Endosulfan is an acutely toxic organochlorine compound (WHO Class II) that is easily absorbed through the skin and has a long history of occupational poisonings. Hoechst's product manual includes an extensive list of precautions for handling or applying Thiodan, including wearing "protective clothing including respiratory mask, rubber gloves and face shields or goggles."

Violations of the advertising articles and other provisions of the FAO Code are frequent in part because the Code is voluntary. Although the Code encourages citizens to promote compliance with the Code and publicize Code violations, the FAO itself has created no mechanisms for monitoring or enforcement. To address this lack and create pressure on industry to improve its practices, Pesticide Action Network (PAN) groups in many countries have monitored and publicized violations of the Code since its passage. Beginning in 1987, PAN has produced numerous reports of FAO Code violations, focusing on countries in Africa, Asia and Latin America.

For example, the 1989 study, *The FAO Code: Missing Ingredients,* documents instances of advertising and promotional materials that violate the FAO Code from Colombia, Costa Rica, Ecuador, Indonesia, Malaysia, Mexico, Paraguay and the Philippines. The list of violators includes some of the world's largest pesticide companies: Bayer, Ciba-Geigy, Dow, ICI, Hoescht, Monsanto, Rhone-Poulenc, and Shell.[10]

photo by Monica Moore

Poster in shop of ICI distributor, Quetzaltenango, Guatemala, 1992.

The companies' advertising practices do not stop at images of tropical paradises or promises of bountiful crops. Ads frequently offer sweepstakes, premiums, or gift drawings to pesticide buyers (examples include Shell in Thailand, Bayer in Indonesia, Monsanto in Malaysia), show men or women spraying pesticides wearing little protective clothing or equipment (examples include Union Carbide for Temik, DuPont for Lannate), or simply show women wearing little or no clothing at all.

The ICI Fusilade ad on this page, photographed late last year in Guatemala, illustrates this latter approach. (The active ingredient of Fusilade is fluazifop-butyl.) It shows a young, blonde woman wearing a grass skirt and a bikini in one picture, and only a bikini in the next. The caption printed below states: "Fusilade: makes grass weeds disappear completely."

What might the pesticide industry say about its compliance with FAO Code advertising standards, now, eight years after adoption? Perhaps the International Chamber of Commerce said it best in its code for promotional practices: "advertising should be judged by its likely impact on the consumer, bearing in mind that the consumer is usually motivated by the impression gained from a brief scanning of the advertisement."[11]

The international pesticide industry, through their professional association, Groupement International des Associations Nationales de Fabricants de Produits Agrochimiques (GIFAP), has stated repeatedly that its members are making efforts to implement the FAO Code. Many of the companies named above have claimed in particular that they have adopted the practices urged in the Code in countries where they advertise their products. Industry would have us believe that corporations have reformed their advertising practices steadily ever since the FAO Code was written. Yet the ads pictured here demonstrate a vast gulf remains between FAO Code policy and corporate practice.

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3. O'Brien, M. 1989. "Paraquat," Journal of Pesticide Reform, Summer.

4. Ibid. 5. Ibid.

6. Greenpeace Int., op.cit.

7. The FAO Code, Article 5, Section 2.3.

8. Hassna, S.A., et al. 1983. "Results of the second joint pesticide testing programme by the IOBC/WPRS - Working Group "Pesticides and Beneficial Arthropods." Zeitschrift fur angewandte Entomologie 95, 151-158.

9. Environmental Health Criteria 40: Endosulfan. World Health Organization, Geneva, Switzerland, 1984.

10. The FAO Code: Missing Ingredients *(see below).*

11. Problem Pesticides, Pesticide Problems *(see below), page 25.*

Peg Stevenson was formerly Atmosphere and Energy Campaign Director for Greenpeace U.S.A., and is currently studying public policy at the University of California, Berkeley.

Several publications available from PANNA focus on enforcement and violations of the FAO Code (see page 19 to order):

The FAO Code: Missing Ingredients, 1989. The final report on PAN International's investigation of the implementation of the FAO Code. English, Spanish, and French. The Pesticides Trust. 112 pp. US$8 (shipping US$1.50).

Problem Pesticides, Pesticide Problems, 1989. Gretta Goldenman and Sarojini Rengam. 2nd edition. Citizen's action guide to FAO Code. International Organization of Consumers Unions. 183 pp. US$15 (shipping US$1.50).

The Pesticide Code Monitor, 1989. Gretta Goldenman and Sarojini Rengam. A training manual for activists with practical tips for investigating pesticide use and problems at the local level. 156 pp. US$15 (shipping US$1.50).

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 with a focus on the developing world. Zed Books. 228 pp. US$19.95 (shipping US$2.50).

Monitoring the International Code of Conduct on the Distribution and Use of Pesticides in North America, 1988. Marion Moses, M.D. Field survey of pesticide-related working conditions in the U.S. and Canada. 25pp US$5 (shipping US$1).

Herbicide Resistant Crops in the Third World: Appropriate Technology?

By Susanne Neubert and Jürgen Knirsch

Are transgenic, herbicide resistant crops part of a solution to hunger in Third World countries? In the Third World, these crops are being promoted as a weapon against hunger. A preliminary examination of the world hunger situation and population development shows that the average food supply per person increased over the last three decades.[1] However, the problem of hunger is closely connected to poverty and has not diminished with the increased food supplies. It is estimated that there are between 500 million to one billion hungry people in the world.[2] *Herbicide Resistant Plants and the Food Supply in the Third World*, a report by PAN Germany, analyzes the potential contributions of HR technology to food supplies as well as its possible environmental impacts.

From the pesticide industry's point of view, HR crop technology makes a lot of sense. Research and development for one new pesticide costs approximately $157 million and takes about 10 years.[3] The use of old, broad-spectrum pesticides (for example, atrazine, bromoxynil, glufosinate, glyphosate, sulfonylurea, paraquat, and 2,4-D) with herbicide resistant crops prolongs the use of these herbicides, can widen the range of crops on which it can be used, and makes the farmer more dependent on the chemical company. All this adds up to improved cost efficiency for research and development that might provide the company with a competitive edge in a tight pesticide market. Following this line of reasoning, major pesticide companies have incorporated seed companies into their corporate structure.

Criteria for selecting potential HR crops are their worldwide importance, high value, safe markets (primarily industrial countries), potential for cultivation in temperate zones, suitability to HR gene transfer, high seed purchases before every season, sensitivity to herbicides, and a crop's "need" for an herbicide. Corn and soybeans are at the top of the list for worldwide herbicide sales, followed by rice and cotton.[4] To assure the loyalty of its customers (farmers), the diversified pesticide producer will select hybrid varieties. Soybeans, cotton, and corn, with its advanced development of hybrids, are crops for which HR technology will be strongly pursued. Since the industrial countries will be the major producers and consumers of the HR package, the crop variety as well as the pesticides will be developed primarily for temperate zones and a capital-intensive, high input farming system.

Research and development for biotechnological innovations is expensive and often at least partially funded by tax money through university research. Market potential increases with the gross national product of a country and decreases as foreign debts rise. Only richer developing countries can afford to buy the expensive products of this research. In Third World countries, the introduction of HR crops would have to be tied to development aid programs from industrial countries.

Weed Control in Third World Countries

Farming systems in the tropics are primarily small-scale, labor-intensive and low input. Agroforestry and other intercropping systems prevail on 90% of the cropland in most African countries[5] and on 20 - 90% of the cropland in Brazil.[6] In India, up to 80 different crops are cultivated on one field. Experts agree that intercropping contributes to highly sustainable farming systems; development aid agencies are now fostering such systems as well.

The most serious weed problems in the tropics are generated by parasitic weeds (*Striga, Cuscuta, Orobranche*) and water weeds (*Eichhornia crassipies*). Parasitic weeds can cause total crop failure. Since the emerging parasitic plant can seriously damage the crop, effective chemical control approaches focus on pre-emergent application. This contradicts a major principle of integrated pest management, which holds that pesticides should only be applied on the grounds of economic thresholds, in this case as determined by weed counts. Additionally, parasitic weeds require many herbicide applications in the context of chemical control. However, an appropriate crop rotation and trap crops together with good soil management are generally just as effective in controlling these types of infestations.[7] For the other major weed problem in the tropics, water weeds that jam rivers and irrigation canals, HR technology does not offer any solutions.

Currently herbicide use in Third World countries is very low compared to the use of other pesticides. Whereas herbicides account for 40% of total pesticide use worldwide, they account for only 13.7% in the Third World.[8] Most Third World countries have an abundant supply of cheap labor, and hoeing of weeds is widely practiced particularly since the opportunity costs for labor are close to zero.

HR Crops Threaten Agricultural Sustainability

The high research and development costs for transgenic HR crops will severely limit the available selection of crop species and varieties. Therefore, the technology favors monocropping with high-yielding hybrids and all its associated economic and ecological risks. Broad use of HR crops could drastically curtail the acreage in multicropping systems which are widely recognized as being more sustainable than monocrops. Additionally, intercropping systems in many cases need only one weeding activity per growing season, whereas monocultures take two to three (or more). Other sustainable systems, including rice/azolla systems and rice/fish systems, are not compatible with the HR technology because of the herbicide sensitivity of these organisms. Even in the highly improbable case of intercropping with HR crops, the degree of freedom for the farmer in making his or her crop selection would be severely limited.

The use of a restricted number of high yielding HR varieties threatens to hasten the already serious genetic erosion in Third World countries. Reliance on a few high yielding varieties encouraged by high input, Green Revolution model agricultural production has already led to a higher genetic susceptibility and the loss of well-adapted regional varieties. Genetic erosion also further increases the farmers' dependence on the pesticide industry.

The HR technology to date involves only broad-spectrum herbicides. What is their ecological impact on the weed communities of a cropping system? Conventional practice has proven that the more effective a method of weed eradication, the stronger the selection for resistant weeds. The resistance starts a vicious cycle since farmers commonly react to a loss in herbicide effectiveness with higher dosages and more frequent applications of herbicides. The cycle continues with increasing selection pressure towards herbicide resistance in the weed species. In the tropics, this effect can be expected to be even worse, as crops can be grown all year round, and with two or three harvests, the total amount of herbicide applied annually doubles or triples. In this way the selection pressure also furthers a shift within the weed community to more problematic weeds, since they are most frequently the targets of chemical control measures.

Soil erosion and desertification are already major problems in the tropics and subtropics and are critical threats to long-term food production. Fragile soils and extreme weather conditions make protection of the soil imperative, and weeds can provide soil cover, mobilize nutrients, and add organic matter. Experience in Southeast Asia teaches that clean weeding can ruin soil fertility in a short time in subtropical and tropical zones. Yet the exclusively broad spectrum herbicides used in HR technology destroy all weeds at once. Theoretically it is possible to use HR crops in mulching systems but the lack of expertise with these systems in developing countries makes its use highly improbable.

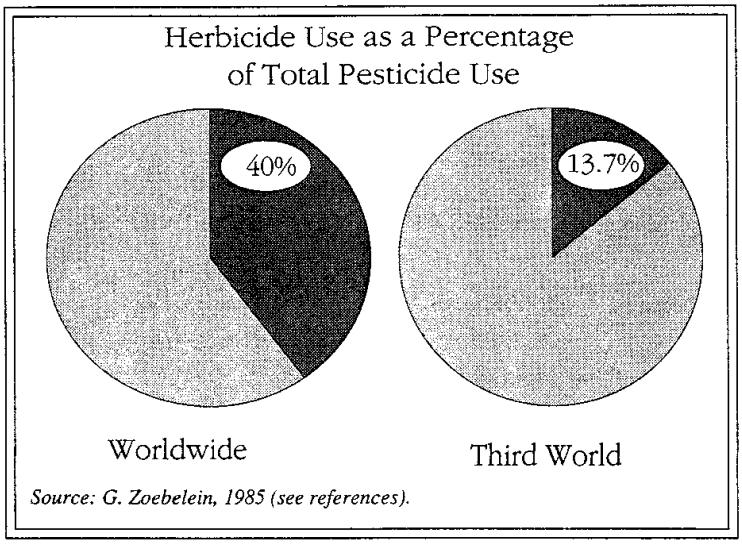
Most modern crops originate in the tropics and subtropics. In these regions, related wild forms of most modern crops exist – often as weeds growing with the cultivated crop relative. To some extent the wild forms can cross-pollinate with the cultivated forms. Spontaneous interbreeding with weedy relatives seems to be the most probable for cotton and rice, which could result in HR weeds, thereby aggravating weed problems.

Conventional herbicides above a certain application rate inflict a negative impact on the tolerant crop. Higher herbicide dosages may be used when the quantity of herbicide applied is not limited by the cultivated crop. A variety of problems may result:

- The cultivation of a non-HR crop in the crop rotation can be made impossible because of high pesticide residue levels in the soil after the harvest.
- The produced food and fibers may contain higher amounts of pesticide residues.
- Accumulation and leaching of herbicides increases the probability of surface and groundwater contamination with resulting hazards for people and ecosystems.

Higher herbicide dosages will also amplify the negative impacts of herbicide use. On average, herbicides produce a mortality rate of 10% or greater for beneficial insects and increase the susceptibility of the crop to diseases.[9] Since the disease pressure in the tropics is much higher than in temperate zones, these side effects could severely impact the health of the crop and increase crop losses and/or the application of insecticides, acaricides, and fungicides.

The eco-toxicological behavior of pesticides in the tropics also affects the impact of the HR crop systems. Hot and humid weather favors microbial decomposition and strong solar radiation hastens photochemical breakdown. On the other hand, dry soils in arid areas slow decomposition. The two-layered clay minerals predominant in the tropics have different adsorption and desorption characteristics than temperate three-layered clay minerals. The cation exchange capacity (CEC) is also lowered by the very low organic matter content in most tropical soils. This changes half-life, metabolism, and percolation behavior of a pesticide significantly from values in the temperate zones, where these pesticide characteristics were originally determined.[10] Thus, eco-toxicological studies conducted in temperate countries may not be useful for predicting impacts of increased herbicide use in the tropics.



Source: G. Zoebelein, 1985 (see references).

Conclusions

This assessment of HR technology in the Third World demonstrates that any potential benefits of improving the food supply would be accompanied by overwhelming new risks to traditional farming systems and to ecological systems. A major danger is the simplification of diverse, regionally adapted multicropping systems to monocropping systems, followed by genetic erosion of regionally developed varieties. Adoption of clean weeding practices could worsen soil erosion. The increased herbicide usage linked to HR technology will accelerate the development of weed resistance, aggravate the negative impacts of herbicide use, and increase contamination of the ecosystem. Finally, the ecological risks of transgenic plants in the tropics and subtropics should be evaluated together with the risk of introducing HR genes into the

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industrial equipment and supplies, agricultural inputs such as fertilizer and pesticides, and foodstuffs – possibly as much as 57% of the total calories consumed by the population. [1]

When trade relations with the socialist bloc collapsed in 1990, pesticide imports dropped by more than 60%, fertilizers by 77%, and petroleum for agriculture dropped by 50%.[2] Suddenly, an agricultural system almost as modern and industrialized as that of California was faced with a tremendous challenge: the need to double food production while more than halving inputs, and at the same time maintaining export crop production so as not to further erode the country's desperate foreign exchange position. In 1991 the government declared the "Special Period in Peacetime," which basically put the country on a wartime style of austerity program.

photot by Jeff Dlott

Farmer using oxen rather than a tractor for cultivation before planting.

Generating and Using Knowledge

Since 1989, the Cuban government has adopted the policy to promote a new science of agriculture. From 1989-1992, the government moved to implement this policy at the levels of the research station, the extension services, and the farm producers. For a large country, such a rate of change in scientific research patterns would be unimaginable. Even in a small country, it is an impressive achievement.

This emphasis on a new science of agriculture marked the second major shift since 1959. An "alternative agriculture" movement had taken hold among Cuban researchers as early as 1982 that produced many promising research results. These had remained unused until recently when they were made available for immediate and widespread implementation.

Before the revolution of 1959, Cuba had limited facilities for agricultural research, and the research done was primarily oriented toward production of export crops dominated by foreign interests. Little work was focused on improving the farming and diets of most of the Cuban people.

Cuba's new research directions heavily emphasize understanding and exploiting the subtle yet powerful abilities of biological organisms to perform many of the tasks previously done by synthetic chemicals. Biologically-based or -derived fertilizers and biological control of pests are at the heart of this new quest for biologically sophisticated management of agroecosystems.

Local Knowledge and Popular Participation

The policy objectives of the Special Period, to achieve a low petrochemical input sustainable agriculture without reducing yields, have required a major reorganization in the structure of agricultural research and extension in Cuba and the flow of information. The de-emphasis of capital- and energy-intensive technologies requires new relationships between scientists, extension agents, and farmers. The pre-existing role of scientists as generators of innovative technological packages and of extension agents as conduits of their delivery to farmers is clearly changing in favor of a partnership between the three in the development and dissemination of new agricultural approaches.

A pivotal component of the Cuban research shift toward sustainable agriculture is exploration of the knowledge of the country's farmers. As part of the "new science," the Ministry of Agriculture has placed explicit emphasis on increasing the degree of local participation in decision-making and developing agricultural systems adapted to local agroecological conditions.

At the community level, the Ministry has encouraged the recovery of former land use practices such as animal traction, intercropping, biological pest control techniques, crop rotations, and agro-pastoral and agro-forestry systems. At the time of the delegation's visit, the replacement of tractors by animal traction for land preparation in the food crops sector was well underway – over 100,000 oxen were being used. This large-scale application of one traditional technology is being promoted as a prototype for other forms of local knowledge that facilitate the shift to a low input sustainable system of agricultural production.

Toward this objective, the Ministry of Agriculture currently sponsors farmer-to-farmer and farmer-to-extensionist/scientist workshops in the provinces. Farmers from different regions facing similar problems are brought together for information exchange. The objectives of this exchange are to (1) make locally adapted/developed technologies known to a broader audience; (2) facilitate farmer knowledge of techniques and practices successfully used in other regions; and (3) promote scientific research and development of promising low input innovations.

Cuban scientists have become increasingly reliant on farmer innovation and experimentation for research directions that complement their efforts to develop promising organic farming practices as well as to adapt techniques developed outside the country. They are emphasizing technologies recovered or developed at the local level that have widespread applicability, which extension agents and scientists disseminate over a broader region, and low-input technologies utilized in other countries, which are promoted for local experimentation and adoption.

The renewed emphasis on germplasm banks illustrates how local knowledge and community participation are being incorporated into Cuba's sustainable research program. Farmers are encouraged by the Instituto Nacional de Investigaciones Fundamentales de la Agricultura Tropical (INIFAT) to collect currently utilized and promising varieties of food crops for evaluation and germplasm conservation. The conservation of genetic material is considered urgent by INIFAT researchers because genetic erosion has been accelerated by the widespread

adoption of Green Revolution technologies.

Moreover, emphasis on labor-displacing mechanized agriculture in the past resulted in the steady out-migration to cities of farmers with knowledge of local varieties. As these dramatic changes have occurred in less than one generation, there is considerable potential for rescuing funds of local knowledge that might otherwise have vanished.

Despite the progress that has been made, and the apparently good intentions to rescue local knowledge and promote more participatory research, Cuba's accomplishments still lag behind those of the non-governmental organization (NGO) movement in other developing countries.[3] Yet if one considers that in these other countries NGOs are often filling the vacuum left by disinterested governments, as well as the fact that there is no NGO role in Cuba, then the active role of the Ministry of Agriculture in promoting changes becomes all the more impressive.

Our delegation found that the country has embraced the challenge of creating a comprehensive and scientifically sophisticated knowledge base to support the new model for food production. Indeed, the impression we received is that Cuba is now one of the most important places in the world for scientific research in sustainable agriculture.

IPM and Biological Controls

One of the keys to Cuba's new model of agriculture is to find ways to reduce chemical use for management of plant diseases, insect pests, and weeds. Agrochemicals were introduced in Cuba in the 1940s, and eventually became a cornerstone of Cuban agriculture. In its efforts to increase production of both exports and locally consumed crops, the Cuban government promoted the ever-increasing use of pesticides. However, rising import costs as well as the development of resistance, pest resurgence, and secondary pest outbreaks, combined to slow this trend well before the crisis of 1990.

By 1982 Cuba was shifting toward an integrated pest management (IPM) paradigm, the integrated use of a variety of alternative pest, disease and weed control tactics, in order to reduce reliance on chemical pesticides. A key component of IPM in Cuba is biological control, in which natural predators, parasites, diseases and antagonists of pests are deployed in order to manage pest populations.

Cuba has a tradition of biological control that dates to the 1930s, when the parasitic fly *Lixophaga diatraeae* was introduced by North American researchers to control the sugarcane borer. However, more formal national research programs on biological control did not begin until the 1970s. In 1985, after many years of research, those efforts were transformed into a major campaign, and biological control began to replace pesticides as the conceptual basis for pest management.[4]

Although these efforts did achieve a reduction in pesticide use, Cuba was still importing US$80 million in pesticides per year when the Special Period was declared in 1991.[5] Fortunately, 20 years of increasingly intensive research in biological control and other alternatives had prepared Cuba to undertake one of the most ambitious enterprises in IPM in the history of any country.

The areas that have received the most attention in the last few years have been the development and mass production of bioinsecticides based on insect pathogens, and the mass production of insect natural enemies (mainly parasitic wasps and flies). The Cubans have also pioneered the use of ants for the control of sweet potato and banana pests. The development of botanical pesticides based on plant extracts is another area that has grown in recent years, with particular interest in the neem tree. Most recently Cuban researchers have been working on techniques based on mass release of sterile males to suppress pest populations, but this work is still in the research stage. Finally, research and use of chemical pesticides still continues, but to a limited degree. The pesticide department is actually the smallest program at the Institute of Plant Protection.

Initiation of the Special Period provided the opportunity for Cuba's focus on IPM to flourish in unprecedented ways. By the end of 1991, an estimated 56% of Cuban crop land was treated with biological controls, representing a savings, after costs, of US$15.6 million per year.[6]

photo by Jeff Diott

Mural at the leading agricultural research center in Cuba, Centro Nacional de Sanidad Agropecuaria.

Pest and Disease Monitoring

Cuba has in place a pest and disease monitoring system that is unrivaled in the developing world. This is important, for example, when a pathogen or pest develops resistance to the pesticide used against it. It can be time-consuming and expensive to find alternative methods of control. To prevent such resistance, resistance monitor plots were set up in Cuba with the help of Soviet scientists in the early 1970s. Before that time, pesticides were sprayed on a regular schedule, but increased costs and environmental impacts made it necessary to reduce pesticide use.

Currently, each local research center in Cuba maintains small plots of that area's important crops. As soon as resistance to a pesticide is

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detected in a pest or pathogen, the pesticide in question is temporarily retired and replaced with other control measures. Because of these tactics, Cuba is the only country in the world still able to use the systemic fungicide Ridomil against tobacco blue mold. Today more than 90% of Cuban agriculture uses some kind of pest and disease monitoring. However, the monitor system has not been modified for use with biological control techniques; the means of controlling a pest or pathogen outbreak depend largely on what alternatives are available in that area.

The disease and pest loss data are not in a computer database and do not appear to have been well exploited for epidemiological modeling. This is unfortunate as they represent a unique long term data set on the incidence and severity of pests that could provide insight into mechanisms behind the incidence and spread of pests under tropical conditions.

Production of Biological Control Agents

For our delegation, the most interesting aspect of contemporary insect pest management efforts in Cuba was the Centers for the Production of Entomophages and Entomopathogens (CREEs) where decentralized, "artesanal" production of biocontrol agents takes place. Despite limited resources, the government has invested its capital in construction and operation of these centers. By the end of 1992, 218 CREEs had been built throughout Cuba to provide services to state, cooperative, and private farms.

The centers produce a number of entomopathogens, as well as one or more species of *Trichogramma,* depending on the crops grown in each area. CREEs are maintained and operated by local technicians. It was exciting to see the sons and daughters of campesinos producing products of modern biotechnology on a local scale. To our knowledge, such a large-scale, government sponsored system exists nowhere else in the world.

The CREEs are part of a two-pronged strategy for production of biopesticides. They are considered to be "artesanal production" – although they are certainly high tech by most standards. Cuba also has a network of over 30 brewers yeast factories that use large scale fermentation technology. These factories are now being converted to mass produce biopesticides on an industrial scale during idle times. Thus, there will be a high quality "commercial" product for the high end market – state farms and large coops that produce for export – while the network of CREEs will continue producing a lower priced product for local use.

Entomophagous insects eat or parasitize other insects, and thus can be released to achieve biological control of pests. The longest running biological control program in Cuba involves the parasitic fly *Lixophaga diatraeae* mentioned earlier. Since 1968, this species has been reared and released in a massive program that now covers 100% of the area under sugarcane "seed" production, as well as large areas under general sugarcane production.

The other major effort in mass rearing and release of entomophagous insects is with tiny wasps of the genus *Trichogramma*, which parasitize the eggs of insect pests. Local species of *Trichogramma* are used to combat the cassava horn worm, the tobacco budworm, various caterpillars that attack improved pasture grasses, and other common pest species.

Entomopathogens are diseases of insects – bacteria, fungi and viruses. As they are not human disease organisms, they offer the possibility of non-toxic pest control. It is in this field especially that Cuba has a substantial lead over most countries in the world. Here the Cuban investment in biopesticides is starting to pay off.

Research and development efforts in Cuba have led to techniques for the production, harvesting, formulation, application, and quality control of numerous bacteria and fungi, including *Bacillus thuringiensis, Beauvaria bassiana, Metarhizium anisopliae and Verticillium lecanii.*

Cuban scientists are also pursuing several other lines of research in developing alternatives to conventional insecticides, including work on parasitic nematodes and plant-derived pesticides. A program to develop reliable and cost effective methods for the production and field application of several species of nematodes that attack insects is currently underway; however, mass production is still in the developmental stages.

Scientists are also screening a large number of plants for insecticidal, fungicidal, bactericidal, and herbicidal qualities. In addition to these screening efforts, applied work has been initiated on the cultivation and production of two species of plants with known insecticidal qualities, neem and Melia. Small plantations of neem and Melia have been started and research on formulations and application methods is advancing.

Conclusion

Over the course of the our visit, we discovered that the Cubans have the scientific expertise, political will, public awareness, and individual motivation to construct a sustainable food production system. They are moving forward even though outdated international Cold War politics and the U.S. policy towards Cuba have slowed the transformation process and threaten to undermine it. Their reconstruction of an agricultural research and extension apparatus supportive of sustainable agriculture is a feat in itself. The widespread application of sustainable production methods is proof of the ecological, social, and economic viability of Cuba's both newly developed and traditional strategies for sustainable agriculture.

** This article was prepared by Jeff Dlott and Ellen Hickey. It is based on excerpts from* Two Steps Backward, One Step Forward: Cuba's Nationwide Experiment with Organic Agriculture, *edited by Peter Rosset and Medea Benjamin, and also contains addtional information and analysis. Contributors to the sections excerpted in this article include: Judy Carney, Jeff Dlott, Julio Monterrey, Ivette Perfecto, John Perkins, Peter Rosset, Nina Shishkoff, and John Vandermeer.*

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What's in the Pipeline?

Two U.S.-based plant biotechnology companies, Monsanto and Calgene, are major players in the development of transgenic cotton varieties, though no varieties are currently available for commercial sale. Agracetus has licensed its patent on transgenic cotton to both companies, but only for the purpose of modifying agronomic traits such as herbicide or insect resistance. Agracetus will retain exclusive use of its patent on transgenic cotton for fiber modification. Terms of the licensing agreements were not made public.

The involvement of Calgene and Monsanto in transgenic cotton research and development is particularly noteworthy. Together, these two companies own, or have significant interests in, two of the largest cotton seed companies, accounting for approximately 61% of the U.S. cotton seed market.[3] Their agreement with Agracetus further expands their control over the U.S. cotton seed market.

In 1986, Calgene Inc. acquired Stoneville Pedigreed Seed Company, the second largest cotton seed company in the United States. Calgene has a joint development agreement with French-based Rhone-Poulenc to develop cotton varieties resistant to its proprietary herbicide bromoxynil, which will be marketed by Stoneville Pedigreed. The so-called BXNR cottons will be grown commercially on 3,000 to 6,000 acres in 1994. According to company spokesperson John Callahan, Calgene's target is to reduce the use of agrichemicals on cotton to just one-fifth the current level through the introduction of herbicide tolerant and insect resistant cultivars over the next 15 years.[4]

In June, 1993, Monsanto purchased 500,000 shares of Delta & Pineland, which was previously the largest independently-owned cotton seed company in the United States. Delta & Pineland varieties accounted for 53.6% of all cotton acreage planted in the U.S. in 1992.[5]

Of 50 applications submitted to the U.S. Department of Agriculture for field testing of genetically engineered cotton varieties between 1988-1993, 22 were submitted by Calgene, and 20 by Monsanto.[6] Both companies are working on two traits: herbicide tolerance and insect resistance. Other companies active in research and development on transgenic cotton include Du Pont, American Cyanamid, and Bayer (Germany).

The Future of Cotton R & D

Many scientists voice concerns about the potential impact of Agracetus' patent on the future of molecular biology research on cotton. Professor Neil D. Hamilton, Director of Drake University's Agricultural Law Center (Iowa, USA) writes, "A claim to a whole crop species is perhaps the ultimate trump card in a serial stacking of competing patent claims. If such a broad based patent is in fact possible it would have a direct effect on the ability of other researchers, both public and private to continue their efforts to improve cotton."[7]

Historically, research exemptions allow the use of protected intellectual property for true research purposes, without infringement of patent rights. Utility or industrial patent law (the type of patent granted to Agracetus) makes no provision for a research exemption, although judicial decisions (in U.S. courts) appear to provide an exemption for non-commercial research. But ambiguities arise in determining what constitutes "non-commercial" research. In recent years, for example, some public sector researchers have received intimidating letters from corporations warning that the researcher's work might infringe on intellectual property rights.[8]

graphic by Youn K. Kim

Traditionally, the work of public sector plant breeders in U.S. universities and agricultural research stations was to release varieties to the public — a service performed by tax-supported public servants. But all of that is changing rapidly. Increasingly, the work of public sector breeders is germplasm enhancement.

With sharp cutbacks in state and federal funding, taxpayer-supported agricultural researchers in the United States are under intense pressure to seek research funds from private industry. Private companies generally expect exclusive access to intellectual property that might be developed with their support. Many scientists believe that intellectual property rights increasingly restrict the exchange of germplasm and information.

Ironically, Agracetus' breakthroughs in cotton research were partly based on public sector research by scientists like molecular biologist Dr. Norma Trollinger, who freely shared her knowledge with other researchers. Yet Agracetus' patent will severely limit other scientists' freedom to research genetically engineered cotton. Dr. Jerry Quisenberry, Director of USDA's Cotton Systems Research Laboratory in Lubbock, Texas, oversees a federally-funded program on molecular biology of cotton. In reaction to the Agracetus patent, he states: "It's very unfortunate, and it has set a precedent...what's to say the same thing won't happen for other commodities? Public research on cotton, at least at the molecular level, will have to come to a screeching halt."[9]

If a public university develops a genetically engineered variety and they want to release it, how much royalty will they be obliged to pay to Agracetus? According to Russell Smestad, Vice-President of Finance for Agracetus, "We have not established a standard fee structure. We're dealing with this on a case-by-case basis."[10]

Impact on Farmers

Many scientists in both the public and private sector believe that cotton is a crop that could benefit enormously from the application of genetic engineering. Cotton is one of the largest consumers of agrochemicals, and an estimated (US) $2-3 billion is spent globally each year on pesticides to produce it. Of the more than 300 million kilograms of pesticides used annually in the Third World, half is for cotton.[11]

If genetic engineers succeed in developing cotton varieties with built-in resistance to major insects, farmers could benefit from lower input costs, and there could potentially be great benefits to human health and the environment. But given Agracetus' broad patent on cotton, will farmers ultimately realize added value in

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genetically engineered cotton varieties? Professor Neil Hamilton of Drake University's Agricultural Law Center, observes: "...the ability of a company to claim the patented crop would create a mechanism for them to capture most or all of the "higher value" engineered into the product, with farmers paying more for the improved genetics but perhaps the only "improvement" being found in the profits of the companies marketing the seed."[12]

Cotton is a self-pollinating crop, and farmers in many parts of the world save seed from their harvest to re-plant the following year. In the United States, the practice of saving cotton seed is practiced primarily in the high plains of Texas. Under industrial patent law, however, it will be illegal for farmers to save seeds from transgenic cotton plants without paying royalties to the patent owner. What was once viewed as the farmer's inalienable right – the 10,000 year-old ritual of saving seed – is clearly jeopardized by recent developments in plant intellectual property rights.

World's Top Six Cotton Producing Nations, 1992-93

Rank of Producer Nation	Production (in metric tonnes)	Status of Agracetus' Patent
1. China	4.5 million	Pending
2. United States	3.5 million	Issued
3. India	2.3 million	Pending
4. Pakistan	1.6 million	--
5. Uzbekistan	1.3 million	--
6. Brazil	400,000	Pending

Source: RAFI and the International Cotton Advisory Committee, Washington, D.C.

Impact on the Developing World

Cotton is the world's most important agriculturally-produced industrial raw material, and the world's leading textile fiber with an annual farm value of approximately $20 billion. Of the 77 cotton-growing countries, 68 are in the developing world where at least 190 million people derive all or part of their income from cotton growing and handling. An additional 60 million people depend upon cotton processing for their living.[13] If developing nations wish to export transgenic cotton or its products, they would be forced to accept the Agracetus patent claim.

Despite the potential benefits of genetic engineering for a major Third World crop, the Agracetus patents illustrate how intellectual property rights may ultimately restrict, rather than promote innovation in agricultural biotechnology in the Third World. If Agracetus receives broad patent protection in these countries, it could provide a tremendous disincentive for molecular biology research and genetic improvement in cotton in some of the world's most important cotton producing nations. For public researchers, in particular, the cost of royalties could become prohibitive, thus stifling innovation and improvement of this multi-billion dollar Third World crop.

The Agracetus patent will likely jeopardize future exchange of germplasm and information from Third World centers of cotton diversity. As news of the Agracetus patent spreads, scientists, farmers and government officials from these countries may become understandably reluctant to share important germplasm that ultimately becomes the subject of monopoly control, not only in the North, but in the South. Indeed, why should Third World cotton farmers freely share germplasm if they will be required to pay royalties on the resulting genetically engineered varieties? This scenario has serious implications for the future of the cotton industry worldwide.

Trade Impacts

It is important to note that the U.S. International Trade Commission has already placed Brazil, India and China on its watch list of major "offenders" of U.S. intellectual property rights. These countries are under enormous pressure at the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) to adopt more stringent intellectual property laws, for example by granting and enforcing Agracetus' cotton patent request. Ironically, Third World nations at the GATT negotiations are being offered concessions of import liberalization for raw cotton into the United States market (the U.S. has strong quotas regulating imports of raw cotton).

But if Third World nations decide to reject the Agracetus patent claim, they could be prohibited from exporting transgenic raw cotton to the United States and any other country that accepts the claim. It is also possible that textiles or finished goods produced from transgenic cotton could be barred from entry into countries accepting the claim. In effect, this would mean that developing countries would only be able to use transgenic cotton for domestic consumption. In the future, if developing nations want to avoid being locked out of an important sector of the world cotton market, they would be obliged to accept the Agracetus patent claim.

Will Agracetus' Cotton Patent be Challenged?

Scientists, farmers, NGOs and even industry representatives are just beginning to comprehend the potential impact of the Agracetus "species patent." Industry and government officials are cautious in what they will say publicly. Groups like the National Cotton Council and the United States Department of Agriculture/ Agricultural Research Service are now examining the potential impacts, but have not taken a formal position on the issue. Given that the U.S. government invests $56 million per annum on cotton research, the patenting of transgenic cotton should prompt considerable concern.

Although some observers believe the Agracetus patent will be challenged in the United States, much depends on the terms of negotiated licensing agreements. According to John Callahan of Calgene Inc., one of the first companies to obtain a license from

Agracetus for transgenic cotton, "We were offered a license under very favorable terms, so we took it. If they (Agracetus) get too unreasonable, it will probably be challenged in the future."[14]

What may be "reasonable" terms for Monsanto or Calgene, however, may be entirely out-of-reach for public sector researchers, let alone researchers in the developing world. While it is not surprising that Agracetus would choose to keep the license fee at a "reasonable" level with this first-ever "species" patent in the hopes of avoiding challenges and confirming a vital precedent, it is likely that future species claims will come with higher fees and additional market conditions.

Conclusion

The Agracetus patent claim on all genetically engineered cotton sets a dangerous and disturbing precedent in all biotechnology-related intellectual property rights worldwide. The potential impacts on cotton farmers and both public and private research on transgenic cotton are far-reaching, especially in the developing world.

A handful of transnational corporations and agricultural biotechnology firms dominate transgenic cotton research and development. Outside of these major players, it is likely that the Agracetus patents on cotton will stifle rather than stimulate innovation on genetically engineered cotton.

Industrial patents are "legal monopolies," granted by a government in exchange for expected benefits to society as a whole. The negative social and economic impacts of the Agracetus patent, however, far outweigh any potential social benefits. Ultimately, the problem will not be "fixed" simply by challenging the Agracetus patent, although such a challenge is essential. Rather, the issue demands broad societal review of intellectual property laws affecting biological products and processes.

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weed population.

In Third World countries, these risks are heightened in part by a lack of opportunities for training in the methods and technologies imported from developed countries. This creates a propensity among the developing countries for misuse of HR technology analogous to the misuse of pesticides in the Third World. In the long run, HR technology would further the dependence of Third World farmers on pesticides. Regionally adapted improvements to the sustainability of traditional farming systems would be much more effective in securing the food supply.

The HR technologies' promise to fight hunger is doomed to fail. It is highly unlikely that HR technology will increase food production in the South. Once again, transnational companies are aggressively seeking an additional market for their product in developing countries without appropriately modifying it to address the real problems in the region. However, even if HR crops did increase food production, they would not address the major causes of hunger and poverty in Third World countries, which are macroeconomic. Only major changes in the economic relations between the rich North and the impoverished South, as well as within the developing countries themselves, could solve these problems.

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This article is based on Herbicide Resistant Plants and the Food Supply in the Third World *by Susanne Neubert and Jürgen Knirsch with assistance from Crescentia Freudling. It was translated and adapted (primarily from Chapters 2 and 3) by Gisela Wittenborn.*

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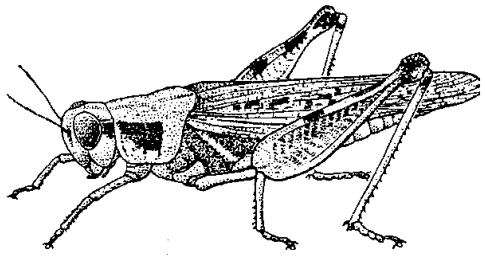
Copies of the study are available free of charge from Science Center Berlin, attn. Mr. Prof. Dr. van den Daele, Reichpietschufer 50, 10785 Berlin, Germany; or contact PAN Germany, Gauss Strasse 17, 22765 Hamburg, Germany; phone (49-40) 393978; fax (49-40) 3907520; e-mail Greennet: PAN-Germany@umwelt.zer.

Locust Workshop Examines Alternative Controls

Since before biblical times, swarms of desert locust have periodically devasted parts of the Sahel, an area of Africa stretching from Mauritania in the west, to the Horn in the east. Swarms were widespread between 1986 and 1989 when the largest locust plague since the 1950s swept across the region. The Food and Agriculture Organization of the United Nations (FAO), the coordinating agency for locust control, organized the fight against these swarms. FAO's primary strategies were barrier spraying across the locusts' path and aerial spraying of the swarms, both of which involved using large amounts of highly persistent organochlorines such as dieldrin.



The FAO was highly criticized for treatment of the 1986-89 plague; critics cited the high levels of pesticides used and the dumps of surplus stocks of older pesticides that still remained, and questioned the efficacy of the program itself. According to a report published by the U.S. Office of Technology Assessment,[1] donors spent approximately US$40 million in 1986 to control locusts that threatened 3% of crop production in the nine most affected African countries. These efforts saved crops worth an estimated US$46 million, representing three-fifths of the crops threatened, but less than 2% of total crop production in the region.

In May of this year, the FAO organized a workshop[2] in Morocco to develop a short-term research program for alternatives that can be used until more environmentally-friendly locust control methods are available. The workshop was attended by representatives from locust-affected countries and regional locust control organizations, research scientists, the pesticide industry, environmental organizations (The Pesticides Trust, Greenpeace International, and WWF International) and donor agencies.

At the workshop, representatives from Morocco, Algeria, Saudi Arabia, Yemen, Mauritania and the regional organization OCLALAV (French Joint Locust and Bird Control Organization) stressed the importance of environmental protection in locust control and the need to fund locally appropriate ecological research. Currently, pesticides approved for use by the FAO include pyrethroids, carbamates, and organophosphates. Though the older, more persistent organochlorines such as dieldrin are no longer used, pesticides now used are still dangerous to applicator/operators and exposed residents in the region, as well as to the environment.

Several alternatives are now being developed. The new generation of benzophenyl urea insect growth regulators (IGRs) may be effective against marching juvenile hopper bands, but are not effective against fully or nearly developed adults. IGRs are ingested after contact and prevent a complete molt from taking place. Further testing is also needed to determine application methodology, dose rates, width of barriers and intervals between barriers before IGRs can be widely used.

A group based in the United Kingdom, CABI, has demonstrated the feasibility of using fungal pathogens for locust control.[3] They are developing very low volume formulations, that can be made locally and are stable and effective under appropriate climatic conditions. However, before use, issues related to non-target safety, development of resistance, and appropriate biosafety standards for release must be resolved.

There was widespread agreement among those attending the workshop that preventative control programs must be a priority. Other recommendations included:

- the development of ground survey methods and novel detection techniques related to vegetation and meteorology
- improved national and regional research
- further study to establish the effects of pesticides on beneficial organisms and to understand desert ecosystems
- more training for scientists from locust-affected countries
- field trials for promising pathogens and growth inhibitors and repellents
- guidelines for toxicological standards to be met by botanical insecticides.

Many delegates were concerned about the focus on desert locusts, since they consider grasshoppers as serious a problem. Grasshoppers cause damage to crops on a recurrent, seasonal basis, without the drama and crisis that accompany a locust infestation. Grasshopper control lends itself more to farmer centered activities and has greater potential to become part of IPM strategies.

While the purpose of the workshop was to examine the short-term research priorities, long term strategies for locust control were not clear. Environmental groups pushed for an examination of the cost-effectiveness of chemical controls, investigating other solutions such as food and farmer support, and evaluating regional crop losses.[4] These groups maintain that without an examination of the long term goals of locust control and possible alternatives, the use of chemicals threatens to become as end in itself.

The politics of locust control are difficult and complex. The FAO can only coordinate control efforts that are agreed upon by those governments involved. Regional coordinating organizations exist, but their cost and effectiveness were questioned at the workshop. To add to the complications, governments making pesticide donations have their own priorities. Donor countries also contribute to the problem by funding short term solutions resulting in neglect of regional organizations and infrastructure during times of remission.

Environmental groups and many other delegates felt that there is no clear political process to drive locust control. The workshop's recommendations will be forwarded to the Scientific Advisory Committee of the Consultative Group for Locust Research, an FAO body; however, the issue is not on the agenda for the FAO Biennial Conference in Rome in

California Pesticide Reduction Strategy Outlined

by Angus Wright

When PAN North America Regional Center (PANNA) began to work on a plan for a California Pesticide Reduction Strategy in 1992, the idea seemed rather audacious to all concerned. The University of California's Sustainable Agriculture Research and Education Project (SAREP) nonetheless provided funds for the project, with matching money coming from the Moriah Fund and the Gap Foundation. Just over a year later, when we made our report to SAREP on the completion of our initial project, what had seemed audacious had moved firmly into the mainstream. For the first time, the director of the California Department of Pesticide Regulation, the California Senate, and the Clinton administration were all on record as officially committed to the goal of reducing the use of pesticides and pesticide hazards. A process that many felt was inevitable and long overdue has finally begun.

PANNA's California project brought together 46 cooperators from all sectors of the agricultural community, including conventional and organic farmers, pest management experts for Gallo and Del Monte, union representatives, pest management advisors, extension agents, university researchers, public agencies, environmental groups, and citizen activists, to discuss the promise of a pesticide reduction plan for California. Principal investigators Monica Moore, Angus Wright, and project staff Doreen Stabinsky prepared summaries of the plans undertaken by Sweden, Denmark, and the Netherlands as a basis for discussion, and through consultation with cooperators, developed a long list of possible elements of a California plan. At meetings in Merced, San Francisco, and Sacramento, cooperators provided extended and lively commentary on these elements and the European approaches. Doreen Stabinsky then prepared a final document suggesting the methods California should use in a Pesticide Reduction Plan, and discussing the comments of cooperators on the major strategies and tactics proposed.

The basic elements of PANNA's pesticide reduction strategy are

- Establish a numerical use reduction goal that is voluntary and ambitious. We propose that this target be at least a 50% reduction of pesticide use in the state by the year 2000, with 1992 set as the base year against which to measure reduction.
- Establish specific reduction strategies by crop and sector. This process must be designed to include affected communities and interested parties, including farmers, farm workers, environmentalists, consumer organizations, structural pest control operators, health workers, pest control advisors, and extension workers.
- Phase out high-hazard pesticides according to specific criteria based on impacts on human health and the environment.
- Increase funding for alternative agriculture research and extension, specifically through competitive grant programs. Priority should be placed on farmer-identified research problems, and emphasize on-farm, systems research. The role of the extension service should be clearly defined and directed to emphasize the provision of technical assistance regarding alternative production methods.
- Develop a program of financial incentives for growers in transition to alternative agricultural practices.
- Develop a pesticide fee-based mechanism for funding both research and extension alternatives and financial incentive programs. An additional fee should be levied on high-hazard pesticides to discourage use and encourage phase out.

While individual project cooperators disagreed over these policies in both emphasis and specific design, each of the policies found substantial support among the group. PANNA's intention is to continue to pursue development of the pesticide reduction plan in greater technical detail, and with attention to implementation strategies.

But the first element of implementation has clearly been achieved: pesticide reduction policy is now a matter of intense debate and discussion within California as well as at national and international levels. We have moved beyond the frustrating and often self-defeating battles fought pesticide by pesticide with no agreement on the need for an overall vision. It is the vision itself that now must be shaped and made real.

Angus Wright is Professor of Environmental Studies at California State University, Sacramento and serves on the Board of PAN North America Regional Center.

For a copy of Pesticide Use Reduction in the State of California: A Synthesis Report, *contact PANNA.*

continues from previous page

November, and it is not clear how any FAO policy will either be developed or implemented. Given the absence of long term strategies and a lack of a clearly defined political process, it appears that it will be the donors who decide what the actual strategy will be.

The workshop produced a sensible wish list of recommendations for short-term research in desert locust control. However, environmental groups, while welcoming the opportunity to participate, felt that the same things could have been achieved using less time and money, especially since any real decisions are likely to be made by a small group of donor agencies meeting this December in the Netherlands. On a positive note, in contrast with past meetings, the tenor of the arguments about locust control have changed significantly, and the environment is now high on the agenda. However, the central problem remains; there is still no long term strategy for locust control.

Adapted from "The Locust Controversy - alternatives to chemicals available soon," by Peter Beaumont in Pesticides News 21, September 1993.

Contact: The Pesticides Trust, 23 Beehive Place, London SW9 7QR, United Kingdom; phone (44-71) 274-8895; fax (44-71) 274-9084.

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1. U.S. Office of Technology Assessment, 1990. A Plague of Locusts - Special Report. *U.S. Government Printing Office, Washinton, D.C.*

2. FAO International Workshop on Research and Planning for Desert Locust Control, Marrakesh, Morocco. May 24-26, 1993.

3. Pior, C. "Biocontrol of Locusts and Grasshoppers: A Recent Research Program." Pesticides News 19. March 1993.

4. Greenpeace International and The Pesticides Trust, 1993. The Need for a New Approach to Locust Control.

News Notes

SUSTAINABLE AGRICULTURE CONFERENCE IN CHINA

On September 5-13, an international conference on Integrated Resource Management for Sustainable Agriculture held in Beijing provided a rare glimpse into the debate over the future course of Chinese agriculture. Approximately 100 Chinese and 60 foreign participants discussed topics ranging from biological control of specific pests to national and international policy initiatives to promote sustainable agriculture.

While most of the participants were interested in discussing the need to reduce inputs and improve long-term sustainability, the conference reflected the growing influence of international chemical companies in China. Of the 30 participants invited to address the full assembly, three were representatives of the International Potash and Phosphate Institute speaking on the need to maintain or increase reliance on chemical fertilizers in China. Application rates for imported chemical fertilizers and pesticides in East China are already among the highest in the world, and transnational corporations are establishing Chinese trade and "research" offices to exploit this growing market.

Several Chinese delegates outlined the technical, social, and political obstacles that must be overcome to promote truly sustainable agriculture. Li Xiaoyun, Director of the Center for Integrated Agricultural Development (CIAD) in Beijing, argued that, given the Chinese government's policy of modernization and economic sustainability, the greatest challenge will be to introduce concepts of sustainability at the policy level. Li said that Chinese scientists are increasingly taking up this challenge but they have only limited influence. Wang Dehai, also of CIAD, reported that institutional barriers to sustainable agriculture extend to the local level of the agricultural extension service. Extension agents do not educate farmers about sustainable alternatives because now, due to extensive budget cuts, they are too busy selling fertilizers and pesticides for the government.

Though non-governmental voices were conspicuously absent, after the official closing of the conference, Kathy Lawrence of the NGO Working Group on Sustainable Agriculture was able to address the assembly. While domestic "Peoples' Organizations" are forming in China, it is still politically difficult for them to present ideas at such conferences. Of course, this does not explain the absence of international NGOs. In the future, international NGOs will hopefully increase their efforts to bring information and support to sustainable agriculture advocates in China.

Source/contact: Paul Thiers, 3610 Kincaid, Eugene, OR 97405, USA; phone (503) 485-4277; e-mail pthiers@darkwing.uoregon.edu.

SALES BY LEADING PESTICIDE COMPANIES DECLINED IN 1992

Seven of the world's ten leading pesticide producers saw their sales decline in 1992 (in national currencies). Swiss-based Ciba-Geigy led the world market in pesticide sales once again. In general, European countries did poorly last year, largely because of the decline in the West European market. Sandoz was the only European company that increased its sales; German companies overall averaged an 8.5% decline in sales. The performance of European companies was slightly stronger in U.S. dollars. Japanese companies had mixed results in yen terms, but increased sales in dollar terms.

Rankings of top ten companies showed some changes: Du Pont and Monsanto moved up to fourth and sixth place, taking the positions of Bayer and DowElanco, respectively. Possible consolidations would shift these rankings again in the near future: American Cyanamid will likely rise to seventh place after acquiring Shell's agrochemical business, and a possible joint venture between Hoechst and Schering could boost the new company to second or third place.

Top 10 Agrochemical Companies

Company	1992 sales (million US$)	% change from 1991
1. Ciba-Geigy	2,940	+ 0.7
2. ICI	2,362	- 2.1
3. Rhône-Poulenc	1,939	- 1.0
4. Du Pont	1,930	+ 9.2
5. Bayer	1,921	- 0.3
6. Monsanto	1,647	+ 6.2
7. DowElanco	1,580	- 0.8
8. Hoechst	1,359	+ 0.2
9. BASF	1,185	- 3.3
10. American Cyanamid	1,000	+ 12.4

Source: Agrow, August 20, 1993.

PESTICIDES REPORTED IN MISSISSIPPI FLOODWATERS

Hydrologists at the U.S. Geological Survey (USGS) have found surprisingly high concentrations of agricultural chemicals in the Mississippi River and some of its tributaries, in the aftermath of the river's flooding this summer. According to USGS scientists, the results indicate that concentrations of herbicides in the Mississippi are at, or near, the maximum levels detected in a previous study that was conducted during 1991 and 1992. Scientists had expected concentrations to be diluted by the record-high flows, but found instead that they remained at the same levels.

Since flows were so much higher and concentrations of herbicides were the same, the daily loads of these chemicals in the rivers increased by almost 50% over previous measurements. A USGS hydrologist stated, "On several days during the peak flows, we estimated that the Mississippi River at Thebes (Illinois) was carrying more than 12,000 pounds of atrazine per day."

A study of the Mississippi River and its tributaries by the USGS during selected months in 1991-92 indicated that the entire navigable reach of the river is contaminated with a complex mixture of agrochemicals and their transformation products. Scientists found strong indications that under certain conditions there is a significant groundwater contribution to the river. Therefore, the Mississippi River serves as a vast drainage channel for pesticide-contaminated surface and groundwater from the midwestern U.S.

The Mississippi River and its tributaries provide water to about 70 cities, accounting for 23% of public surfacewater supplies for the U.S. Though untreated and partially-treated industrial and domestic wastes are also discharged into the river, USGS scientists state that nonpoint-source pollution by agrochemicals from surface runoff and groundwater discharge may be the most significant factor responsible for deteriorating water quality.

An estimated 200-300 million pounds of herbicides are applied annually to control weeds in the Midwest. Atrazine, the most widely used herbicide in the region, is of particular concern because of its potential to migrate through the soil, and its relatively long half-life. The U.S. Environmental Protection Agency classifies atrazine as a possible human carcinogen based on animal studies.

News Notes

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 EcoNet in the "en.pesticides," "en.toxics," and "en.agriculture" electronic conferences, and distributed worldwide through the member networks of the Association for Progressive Communications (APC). PANUPS is also posted in the Public Conference on RTK NET, on GeoNet in the PESTICIDES-BBS bulletin board, on FidoNet in The Ecology Network, on the Sustainable Agriculture Network (SANET) on BitNet, and on PENpages agriculture information service at Penn State University. Hard-copy compilations are also available. For more information, contact PANNA.

Note: Contact PANNA by e-mail at "panna@igc.apc.org."

USGS found atrazine in every sample from the Mississippi collected in April, May and June, 1991.

Sources: USGS, Department of the Interior, 119 National Center, Reston, VA 22092, USA; phone (703) 648-4460. Journal of Pesticide Reform, Winter 1991. Environmental Science and Technology, Vol. 27 No. 8, 1993.

Contact: PANNA.

TOXAPHENE IN NORTH SEA FISH

Relatively high concentrations of toxaphene, a PAN Dirty Dozen pesticide, have been found in fish around Ireland and Scotland according to researchers from the Dutch Governmental Institute for Fisheries Research (RIVO). Levels of 120 µg/kg of toxaphene have been found in mackerel off Shetland in Scotland. Porpoises contained levels of 1,300 µg/km and white nosed dolphins were up to 19,000 µg/kg. The source of this insecticide is not clear since toxaphene is not used in Western Europe. However, it may have been transported atmospherically after use as an insecticide on cotton in the Caribbean – a distance of about 8,000 km. Previously, toxaphene applied in the U.S. was detected 1,100 km away.

Toxaphene is currently banned in 37 countries and severely restricted in eight. It was banned in the U.S. in 1982 because of concerns about oncogenicity, acute effects on aquatic life, and chronic effects on wildlife. Toxaphene is very persistent, with a soil half-life of up to 29 years.

Source: RIVO Annual Report for 1992, Ijmuiden, The Netherlands, August 1993. Wouter Klootwijk, Vrij, Netherlands, August 1993. Pesticides News, September, 1993.

OECD STARTS NEW PESTICIDE ACTIVITY

The Organization for Economic Cooperation and Development (OECD) will launch a three-year Activity on Pesticides in January, 1994, to help countries assess and reduce pesticide risks. The Pesticides Activity will be directed by a Pesticide Forum composed primarily of government regulators from OECD countries, but also including representatives from the pesticide industry, non-governmental organizations including farm and environmental groups, and other international organizations (e.g. European Commission, FAO, WHO). The OECD is an inter-governmental organization of 24 industrialized countries who meet to discuss issues of common interest and to coordinate national policies.

The OECD Pesticide Activity will have three major goals: promoting sound, consistent national pesticide registration procedures; sharing the work of reregistration of old pesticides; and reducing risks to human health and the environment associated with pesticide use. Initially, the Activity will concentrate in five areas: test guidelines for conventional chemical pesticides, data requirements for registration of biological pesticides, pesticide reregistration, environmental hazard and risk assessment methods, and risk reduction. One purpose of the OECD Activity will be to increase the "harmonization" or consistency of data requirements, testing methods, and review processes used in pesticide registration. OECD members view this, at least in part, as a way to minimize trade disputes caused by differences in regulations.

The risk reduction program will begin during the first year of the Pesticide Activity with a survey of OECD countries' current pesticide risk reduction activities. The survey will cover all types of programs and policies used to reduce risk, from individual compounds to pesticide use as a whole, and encourage adoption of integrated pest management methods. This information will be compiled into a report which will serve as the basis for a workshop in late 1994 to identify an OECD role in pesticide risk and use reduction.

Source: Pesticides News, September 1993.

Contact: Polly Hoppin, WWF, 1250 24th St. NW, Washington D.C. 20037 USA; phone (202) 778-9667; fax (202) 293-9211.

U.S. ORGANIC COTTON CONFERENCE

On September 7-8, 250 people gathered in Visalia, California for the second annual National Conference on Organic Cotton. Organic farmers, cotton ginners, retail companies, environmentalists, and researchers came together in a unique cross-industry forum to discuss the future of organic cotton.

The conference included panels on the organic cotton industry, natural resource concerns, regulatory issues and prospects/problems for organic cotton growers and clothing companies. Many conference participants felt that the market for organic cotton is growing rapidly and that there are tremendous opportunities for both growers and manufacturers, despite some problems. These problems include locating enough certified organic cotton supplies to meet current demands, educating consumers about the benefits of organic clothing, and developing enforceable certification standards in the U.S. and abroad.

From an international perspective, Arif Jamal, a PAN participant from Sudan, spoke about the extremely heavy use of pesticides on cotton in his country. Sudan gets 40% of its national income from cotton exports but is experiencing massive pesticide problems. In the 1920s, Sudan harvested approximately 1,300 kilograms of cotton per acre but now harvests a mere 200 kg per acre, an 85% reduction. Carina Weber, from PAN Germany, explained that the demand for organic cotton is high in her country but "green" labeling by the government is misleading and needs to reflect more environmental and social concerns. The conference also included farmer delegations from Israel and Australia.

News Notes

Source/Contact: Will Allen, California Institute for Rural Studies, P.O. Box 2143, Davis, CA 95617 USA, phone: (916) 756-6555, fax: (916) 756-7429, and PANNA.

WOMEN AND PESTICIDES

PAN Asia and the Pacific (PAN AP) has started a "Women and Pesticides" campaign to compile data on the impact of pesticides on women's health, to provide information and resources to women on pesticides, and to involve women's groups in pesticide issues. The campaign includes a series of national training workshops and a seven country study on the impact of pesticides on women.

Throughout the developing world, women are the backbone of farming. They produce 80% of the food in sub-Saharan Africa, 46% in the Caribbean, 31% in North Africa and the Middle East, and 50-60% in Asia. As a result, women have daily contact with many dangerous pesticides and suffer from a variety of pesticide-related health problems. In Malaysia, for example, 80-90% of the field and general workers in the plantation sector are women, including 30,000 pesticide sprayers. They work with wide range of pesticides, including paraquat, dimetonate, lindane and captan.

The campaign's first country study focuses on women pesticide workers in Malaysia. The 1992 study found that women are usually the lowest paid workers and end up in the most hazardous jobs, including pesticide spraying. The large majority of these women work on a contractual basis, and as a result, their jobs are temporary, poorly paid, and unprotected. Every day they face hazards from the use of highly toxic pesticides like paraquat. They also suffer from a range of pesticide-related health problems including liver, lung and kidney damage, seizures, reproductive problems and even death. Unfortunately, due to high unemployment and lack of economic opportunities, many women feel they have few options besides working with pesticides.

To highlight the problems women face from pesticides and to educate women about pesticide use and poisonings, PAN AP is organizing a series of workshops. In July and September, PAN AP conducted workshops in India and Sri Lanka; in December it will hold a conference in Bangladesh. PAN AP will also conduct six additional country studies on the impact of pesticides on women. In addition to Malaysia, the studies will look at Indonesia, Thailand, India, Korea, Sri Lanka and the Philippines.

Source: V. Arumugam, "Victims Without Voice: A Study of Women Pesticide Workers in Malaysia," Tenaganita and PAN AP, 1992; "Pesticide Monitor" PAN Indonesia, July 1992; and "Women, Agriculture and Pesticides," Terompet, July/Aug. 1993, PAN AP.

Contact: PAN AP (see back cover).

WASHINGTON STATE SUSPENDS MEVINPHOS

On August 31, the pesticide Phosdrin (mevinphos), used to control aphids in apple and pear orchards, was suspended for four months in the state of Washington. The suspension came as the direct result of the poisoning of 17 apple orchard workers from eastern Washington between July 19 and August 31. Julio Romero, a Washington United Farm Workers (UFW) official, stated, "We consider this suspension a major victory for farm workers in this state. This is the first time I can recall that a pesticide was removed because of its harmful effect on farm workers rather than on consumers." U.S. Environmental Protection Agency officials stated that they were concerned enough about the potential harm to farm workers to consider banning it nationwide, perhaps as early as next year.

The workers who were poisoned by Phosdrin required immediate medical attention, and several were hospitalized. Mevinphos, known to be highly toxic, is easily absorbed through the skin. The chemical works on the victim's nervous system, and symptoms include headaches, nausea, and dizziness. Prolonged exposure can lead to involuntary muscle movements, lack of coordination, weakness, salivation, diarrhea, and vomiting. To date, most of the farm workers have returned to work, but at least three others continue to suffer from adverse effects of the poisoning.

In 1989, more than 75 field workers in Florida were poisoned when they were sent back into the fields too soon after pesticide application. At least two farm workers also died in California in the early 1970s from Phosdrin exposure.

Sources: EPA News Release, August 18, 1993; Seattle Times, August 21, 1993; Seattle Post Intelligencer, August 31, 1993.

Contacts: Washington State Department of Agriculture, Pesticide Management Division, Olympia Office: Cliff Weed, P.O. Box 42589, Olympia, WA 98504, USA; phone (206) 902-2040. Environmental Protection Agency (EPA): Rick Parkin, EPA Region 10, 1200 Sixth Ave, Seattle, WA 98101 USA; phone (206) 553-8574.

CANADIAN TOWN'S PESTICIDE RESTRICTIONS UPHELD

The town of Hudson in Quebec, Canada, has won the right to keep a by-law passed in 1991 prohibiting many uses of pesticides within the town. A judge of the Quebec Superior Court ruled that the by-law is legal and within the powers of the Town of Hudson.

The by-law seeks primarily to eliminate the use of pesticides for cosmetic purposes such as lawn and garden use. It does allow six exemptions: in swimming pools; to purify water; inside buildings; to control or destroy animals that constitute a danger to humans; to control or destroy plants which constitute a danger to allergic humans (this refers specifically to ragweed); and as wood preservatives. Farmers are also exempt but are required to notify local authorities of all pesticides used within the town. Golf courses were given a maximum of five years to phase out pesticide use. The by-law does permit biological pesticides to control or destroy insects, although a definition of biological pesticides is not included in the law.

Chemical lawn care companies were strongly opposed to the measure and refused to honor the statute. In 1992, Hudson successfully prosecuted two companies, ChemLawn and SprayTech. Both companies appealed, claiming that the by-law exceeded the powers of the Town Council and that it was "abusive, discriminatory and unreasonable." On August 19, 1993, a Quebec Superior Court judge stated that the Council had acted in the public interest by virtue of inherent powers given them by the Cities and Towns Act.

Citizens for Alternatives to Pesticides (CAP), a grassroots organization dedicated to the reduction of chemical pesticides, applauded the ruling and challenges lawn care companies not to resist the trend and to convert to organic lawn care services. However, the Federation Interdisciplinaire de l'Horticulture Ornementale du Quebec (a lobbying group representing lawn care professionals and gardeners) has stated that it will appeal the decision to the Quebec Appeal Court.

Source/contact: Merryl Hammond, Citizens for Alternatives to Pesticides (CAP), 20 Sunny Acres, Baie d'Urfe, Quebec, Canada H9X 3B6; phone (514) 457-4347; fax (514) 457-4840.

☛ The Resource Pointer #13

Who Would Want Those Apples Anyway?, 1993. Laura and Pam Griscom. A children's introduction to pesticides and organic food. US$4.95 plus $2.00 shipping. Share Publishing, 3130 Alpine Road 3200-1009, Portola Valley, CA 94028, USA; phone (415) 851-0731; fax (415) 854-8202.

Pesticides, Policies and People, 1993. Peter Beaumont. Impacts of pesticides in food and water; occupational exposure to pesticides; and new directions in pesticide policy. UK£13.95. The Pesticide Trust, 23 Beehive Place, London SW9 7QR, England; phone (44-71) 274-9086; fax (44-71) 274-9084.

Preventing Pesticide-related Illness in California Agriculture: Strategies and Priorities, 1993. Pease, Morello-Frosch, et al. Examines pesticide use in terms of risk assessment, risk management, and risk prevention. US$12. California Policy Seminar, 2020 Milvia, Suite 412, Berkeley, CA 94720; phone (510) 642-5514; fax (510) 642-8793.

Pesticides: A Comparative Study of Industrialized Nations' Regulatory Systems, 1993. GAO. Report summary for the U.S. Congress on Organization for Economic Cooperation and Development (OECD) nations' pesticide standards. First copy free: U.S. General Accounting Office, P.O. Box 6015, Gaithersburg, MD 20884-6015; phone (202) 512-6000; fax (301) 258-4066.

Nicaragua Farmers' View. Monthly English bulletin featuring articles on Nicaragua's social, economic, and political situation, the country's agricultural and environmental issues, farm projects and more. US$25 for one-year subscription. Make checks or money orders payable to Circles Robinson-UNAG. Circles Robinson, 1150 S. Flower St., Los Angeles, CA 90015.

IPM Farmer Training: The Indonesian Case, 1993. Indonesian National Integrated Pest Management Program. Examines the progress of the Indonesian government's 4-year large-scale IPM program and its positive impacts on the economy and Javanese culture. Indonesian National IPM Program, J1. Ki Mangunsarkoro No. 5, Jakarta Pusat, Indonesia.

Green Revolution: Impact on Health and Environment, 1993. Voluntary Health Association of India (VHAI). Proceedings of the National Seminar addressing low-impact sustainable agriculture in India and the need to promote farmer training. English. VHAI, Tohn Swasthya Bhavan, 40, Institutional Area (Near Qutab Hotel) New Delhi 110016 India; phone (91-11) 668071; fax (91-11) 6853708.

Pesticides, Rice Productivity, & Farmers' Health: An Economic Assessment, 1993. Drs. Rola and Pingali. Overview of the impacts of pesticide use in the Philippines. International Rice Research Institute, P.O. Box 933, Manila 1099, Philippines; phone (63-2) 818-1926; fax (63-2) 817-8470.

Pestizideinsatz bei der Primärproduktion von Naturfasern: Baumwolle, Leinen (Flachs), (Schaf-) Woole und Seide, 1993. Jürgen Knirsch. A general overview of pesticides used in production of linen, wool, and silk. German. PAN Germany, Gaußstraße 17, 22765 Hamburg, Germany; phone (49-40) 393 978; fax (49-40) 390 7520.

Integrated Pest Management: Farmer Field Schools Generate Sustainable Practices, 1993. Elske van de Fliert. A case study of sustainable rice practices in Central Java. English. Agricultural University, P.O. Box 9101, 6700 HB Wageninen, Netherlands.

Pesticides et Agriculture Tropicale: Dangers et Alternatives, 1993. Dümmler, Schwab, Jäger-Mischke, Thiam, et al. Impacts of agrochemicals on human health in the tropics with recommendations for alternatives. French. CTA, Postbus 380, 6700 AJ Waeningen, Pays-Bas, Netherlands; phone (31-83) 80-60400.

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BOOKS AND REPORTS (use order form, p.19)

Biotechnology's Bitter Harvest: Herbicide-Tolerant Crops and the Threat to Sustainable Agriculture. 1990. R. Goldburg, J. Rissler, H. Shand, and C. Hassebrook. This essential report profiles a disturbing trend in agricultural biotechnology research. Biotechnology Working Group. 73 pp. US$5.

Breaking the Pesticide Habit: Alternatives to 12 Hazardous Pesticides, 2nd edition. 1990. Terry Gips. History of pest control strategies & guide to sustainable alternatives to the Dirty Dozen. Extensive resource & bibliography sections. International Organization of Consumers Unions (IOCU). 372 pp. US$20 (Shipping add US$2).

Circle of Poison: What Goes Around comes Around (Poster). Striking original image, seven-color, hand silk-screened work by artist Doug Minkler. (20"x26") US$18 (Shipping add US$2).

Common-Sense Pest Control. 1991. William Olkowski, Sheila Daar, Helga Olkowski. Least-toxic pest control solutions for home, garden, pets and community. Essential reference containing an extensive listing of alternative products and services. The Taunton Press. 715 pp. US$39.95 (Shipping add US$3.50).

The Corporate Reapers: The Book of Agribusiness. 1992. A.V. Krebs. An exhaustive study of food and farm policy in the U.S. Advocacy ideas for farmers, consumers, and workers. Essential Books. 600 pp. US$19.00 (Shipping add US$3).

The Death of Ramón González: The Modern Agricultural Dilemma. 1990. Angus Wright. Study of the human and ecological costs of international agribusiness and agricultural development schemes in Mexico. University of Texas Press. 337 pp. $30. Now also available in paperback, US$10.95 (Shipping add US$2).

Demise of the Dirty Dozen. 1993. PAN North America Regional Center. Chart illustrates for 70 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.

Harvest of Hope. 1991. Jennifer Curtis with Lawrie Mott and Tom Kuhnle. Documents the potential for dramatic reductions in pesticide use on nine major U.S. crops. Extensive scientific references and background on water pollution and regulations. Natural Resources Defense Council. 123 pp. US$22.95 (Shipping add US$2.50).

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).

Victims Without Voice: A Study of Women Pesticide Worker 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.

Contact the PANNA office for a complete list of publications.

Pesticide Action Network

PAN is an international coalition of grassroots organizations who oppose the misuse of pesticides and support reliance on safe, sustainable pest management methods. 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.

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