PESTICIDES : NECESSARY BUT DANGEROUS POISONS

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The year 1972 saw nearly 500 000 pesticide poisoning cases around the world. The figure for 1981 was 750 000. The problem continues to worsen. It is estimated that every year close to two million people worldwide are poisoned by pesticides, and 40 000 of them die as a result. This trend is disturbing and difficult to explain.

Nearly 85 percent of world pesticide production is consumed in industrialized countries. Yet the incidence of pesticide poisoning is 13 times higher in the Third World.

Is this the price to be paid for high performance agriculture, which increasingly relies on fertilizers, herbicides, and fungicides? Chemical imports have increased phenomenally in the Third World. From 1970 to 1980, the real value of pesticide imports increased more than six-fold.

Perhaps these figures are more of a reflection of researchers' deeper concern about poisonings of this nature. If so, the growing toll is really the result of more accurate data collection.

One way or another, the danger is real. So why continue to use such dangerous products?

Agriculture is now almost impossible without chemical fertilizers or pesticides. In the tropics, most of the soil is not very fertile. Fertilizers are a welcome adjunct. But most of the pests that undermine agriculture are also found in the tropics: rodents, insects, nematodes, fungi, weeds, and so on.

It is also in this part of the world that populations are growing most quickly, in step with urbanization. Subsistence farming, hitherto practiced on small plots of land, is no longer adequate to feed the world. As a way out of the impasse, modern agricultural strategies must be employed, the soil must be continuously enriched, and a strict program must be established to control insects and other pests that destroy crops.

Pesticides also play an important part in most battles against diseases transmitted by insects. Programs to destroy the vectors of malaria, leishmaniasis, Chagas' disease, and onchocerciasis with pesticide sprays have been partially successful.

Unfortunately, this approach by itself presents some serious problems. It is expensive and increases Third World dependency on the industrialized countries that supply the chemicals. Nor does the propaganda stop there. The industrialized countries also suggest that the Third World adopt high-yield crop varieties that require numerous polluting inputs.

Although human health appears to be seriously affected, that is not always true for the insects. The impressive recuperative power of insects from generation to generation is too often forgotten. In very little time, insects develop resistance that enables them to survive most insecticides with impunity!

This explains why the campaigns against malaria-carrying mosquitoes undertaken throughout Africa, Asia, and Latin America are doomed to failure. At the same time, to get around the resistance phenomenon, millions of dollars are spent every year to develop new agricultural insecticides. Since 1945, more than 15 000 compounds have been synthesized to circumvent insect resistance. These same compounds have been combined in 35 000 insecticide mixtures. Nevertheless, insects continue to ravage crops and spread disease. Ultimately, Third World consumers pay the bill.

Some developing countries, such as India and Egypt, have attempted to reduce their economic dependency on the North by asking multinational chemical

Four thousand Sri Lankans die annually because of pesticide poisoning. A poison control centre is trying to decrease this number by informing communities.

producers to set up operations on their soil. In theory, this decision is logical. It allows the countries to produce those pesticides that are indispensable for agricultural production and the maintenance of public health, at affordable prices. In addition, jobs in pesticide plants have become a coveted source of income for workers.

In industrialized countries, businesses are controlled by strict industrial safety standards. In the case of developing countries, unfortunately, manufacturing technologies are often imported without appropriate industrial safety measures to go with them. Why? Frequently, because of economic constraints, lack of understanding of the production process, or simply because of incomplete information. Whatever the reason, the consequences can be disastrous; the catastrophe in Bhopal, India, is eloquent testimony.

It is often forgotten that pesticides are "naturally" toxic to human beings. Indeed, the most popular pesticides, the organophosphates (such as Dianizon and other products ending in similar suffixes) attack the nervous system. They were developed during the Second World War as chemical weapons, but were so toxic that neither side could bring itself to use them before the end of the war. Later, after the war, it was realized how sensitive insects were to them. It was at that point that they made their first appearance in the arsenals of farmers and public health authorities.

Health effects defy explanation

In the 1950s, we were told that everything was known about the chemical mechanisms and physiological effects of organophosphates. Had they not been studied in the laboratory? However, doctors have recently been describing syndromes related to organophosphate poisoning that defy any explanation based on current understanding of the chemistry of these pesticides. How many of these effects are still unknown? How many deaths of men, women, and children in the Third World attributed to natural causes have actually been caused by pesticides. Recent studies conducted in the Philippines by Dr Michael Loevinsohn indicate there may have been many.

Organochloride insecticides such as DDT are another important class of pesticides, although they have been somewhat displaced by organophosphates. They resist environmental degradation so well that they are rapidly incorporating themselves into the food chain. For this reason, their use has been severely restricted. They have even been banned by many countries. However, they are still in use throughout the Third World. DDT is the best known of these. In some African countries, it is even used to protect dried fish from vermin. The problem here is not so much one of toxicity as of attitude on the part of uninformed users.

To deal with insect resistance and pesticide toxicity to people, producers have turned to new classes of compounds, often of plant origin. The pyrethrin extracted from chrysanthemums, for example, is the basis for an important family of pesticides: the pyrethroids. These compounds are less toxic to people. However, several cases of poisoning caused by imprudent use have been reported, particularly in China.

What about the herbicides used primarily in agro-industry to manage fields of coffee, sugar cane, and cotton? These may greatly facilitate crop maintenance, avoiding the necessity of weeding, but they are also highly toxic. Compounds of the phenoxyacetic acid family (such as 2,4,D, for example) are carcinogenic. However, they are widely used in the Third World.

Nearly 85 percent of world pesticide production is consumed in the industrialized countries. Yet the incidence of pesticide poisoning is 13 times higher in developing countries. These figures speak for themselves. It is imperative that the scope of pesticide poisoning be clarified and that the factors that make it such a serious problem be identified.

Third World researchers must never lose sight of the complexity of the debate. How can an expanding population be fed without harming the health of farm workers? How can the impact of insect-borne disease be reduced without destroying the ecological balance of our environment?

Epidemiological studies have shown that farm workers are the group hardest hit by accidental poisoning. This is an occupational health problem that could be solved in part by education and training programs.

Several options have been put forward to reduce chemical pesticide dependency: crop rotation, development of resistant varieties, or the use of natural predators. These methods, combined with reduced and careful pesticide use, can produce enviable harvests.

There are promising projects designed to study the natural enemies of some harmful insects. Even bacteria are being brought into play. An example is *Bacillus thuringiensis*, which can inhibit the growth of mosquitoes carrying malaria and yellow fever.

This issue of *Reports* contains accounts of several IDRC-supported projects related to the poisoning of people in developing countries and to the use of pesticide substitutes.

In China, Professor He Fengsheng is studying the health of cotton farm workers who use synthetic pyrethrin derivatives as pesticides. Despite favourable reports on their low toxicity to people, these compounds have already caused serious poisonings in Hubei Province.

In Kenya, a scientist at the University of Nairobi is attempting to clarify behaviour responsible for pesticide poisoning of farm families.

In Sri Lanka, a physician and an epidemiologist have created a poison control centre and are attempting to assess its impact on the incidence of poisoning in the country.

Two other articles deal with attempts to develop and use less harmful pest control techniques. One describes research in India aimed at using a naturally-occurring tiny parasitic organism called *Nosema locustae* to control locusts. The other examines the role of women as active promoters of "integrated pest management" -- an approach that calls for minimal pesticide use -- in farm communities in the Philippines.

In all these cases, the objectives are complementary: to sensitize governments and users by clearly describing the scope of the problem; to identify the causes of poisoning and if possible to discover appropriate solutions; and to find less toxic alternatives to the excess use of chemical pesticides.

This summary of the serious problem of pesticide poisoning should give you an idea of its disturbing scope. Above all, it should demonstrate the dedication of these Third World researchers, striving to create a better and less dangerous world for their people. ■

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