

*The Environment and Agriculture*

THE CASE OF DDT

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Opponents of DDT in the current campaign seem to have lost sight of the fact that all pesticides have some adverse qualities. Measured against these are the benefits possible through their use.

In the United States, Canada, Sweden and other developed nations one hears dire tales about DDT, how it paralyzes fish in lakes, how it flows to the sea where it kills plankton, how bird life suffers from it. Little is said about how DDT saves millions of human lives through the World Health Organization antimalaria programme, or how DDT helps farmers in developing lands to control crop-destroying pests.

In India alone, DDT helped reduce the incidence of malaria from 75 million to five million in a decade. In the Indian subcontinent, insects eat 15 to 30 percent of all farm crops each year. So a massive drive is under way seeking to double the area of cropland protected by pesticides. That drive alone could bring India an extra 1.4 million tons of rice, 100,000 tons of groundnuts, 65,000 tons of sorghum, 250,000 tons of sugar, 46,000 tons of maize and 200,000 tons of potatoes each year.

"Do we save the lives of birds or the lives of human beings?" asks Ernst W. Nagelstein, a consultant to the United Nations. Adds he: "It is true many birds will never sing again if the use of pesticides isn't brought under control. But, millions of human beings won't live to hear the songs of birds again if chlorinated insecticides are brought under a total curb."

DDT, of course, is the main chlorinated insecticide.

Undoubtedly, more attention must be given to man's pollution of the land and atmosphere. Undoubtedly, too, more research should be devoted to the entire question of pesticides before jumping to conclusions about their uses. It might be a good thing, also, if that research were directed by people who either are from developing nations, or who are interested in helping those nations.

The campaign against DDT certainly raises some disturbing questions among people who know and understand the problems in developing countries. Among those questions: Is it right that economies of developing nations be controlled by emotional outbursts in developed countries? Do people in developing countries understand the issues involved? Can adverse effects of pesticides be minimized without banning their use entirely? How can research in these problems be conducted so as to focus attention on requirements of developing nations rather than upon ecological fears of developed countries?

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## A potent killer

Such questions suggest ways of introducing sanity into the current hysterical campaign against DDT and related compounds.

First, it would appear that indiscriminate attacks on pesticides should be resisted by developing nations.

Second, the situation should be publicized in developing nations so that citizens understand what is involved.

Third, integrated pest control techniques should be promoted to minimize adverse effects of chemical residues.

Fourth, research into problems of developing nations should be supported wholeheartedly, with these nations playing a more vital role in that research.

Superficially, attacks on the chlorinated insecticides by the ecological crusaders may seem righteous and worthwhile. DDT indeed is a persistent and powerful chemical. After being sprayed on crops and habitations, it filters into soil or water to remain effective for months, a potent killer for many insects and minute forms of life.

But, it is this very persistence coupled with its effectiveness and low cost which makes DDT and other chlorinated compounds so valuable in developing nations. DDT, developed in 1939 and in wide use since the second world war, has never been matched in the intensive research for chemicals used to control a wide variety of pests afflicting crops and forests, says Dr C. H. Hoffman, an official of the United States Department of Agriculture in Washington.

"The amazing thing is that a compound which was in a sense the first crack out of the researcher's box should still meet many comers in today's fierce search for pest-killers which are safe to handle, cheap and effective."

The United States President's Science Advisory Committee of 1965, for instance, reported that for every American dollar invested in pesticides for crop protection, farmers in the United States saved between \$4 to \$5 worth of crops. No comparable figures are available from developing nations. But, it might be well to note that most of these nations lie in the tropical and equatorial belts where insects are more serious a problem than in the United States.

Relatively, therefore, benefits of pesticides to developing nations probably are far greater than those noted in a rich country like the United States.

In the public health area, DDT's benefits are even clearer. "DDT has been instrumental in controlling some of the most important vector-borne diseases of man." It shows the need for an international non-commercial crash programme of pesticides research says Dr M. G. Candau, Director-General of the World Health Organization in Geneva. "The concept of malaria eradication rests completely on its continued use. Limitations on its use would give rise to grave problems in the majority of developing countries."

When benefits of any compound far outweigh the harm it may do, man certainly should beware of excommunications. When those benefits accrue to developing countries, there is a double reason for seeking sanity. Rich nations can use expensive substitutes for DDT. Developing nations cannot.



*Pesticides are of far greater benefit to developing nations than they are to developed ones. We must find the means to improve our agriculture to feed our ever-increasing population.*

### Five to seven years

DDT costs about 15 American cents a pound and is easy to apply. Most suggested substitutes cost a dollar or more a pound. "There just is no inexpensive substitute for DDT," says an official of J. R. Geigy S. A., Basel, Switzerland, the chemical company which first introduced DDT. A Swiss chemist, Dr. Paul Mueller, won the Nobel Prize for his work with DDT in 1948, a prize based on the fact that millions of lives were being saved through his discovery.

Checks with chemical companies in Europe and America such as Britain's Imperial Chemical Industries and Fisons, Ltd., the Federal Republic of Germany's Bayer, America's Du Pont and Switzerland's Geigy indicate indeed that no cheap and effective substitutes for DDT are on the horizon.

It costs a company \$3 to \$5 million and five to seven years to develop a new chemical compound. This means that chemical concerns concentrate on those items which offer the best prospect for a profit return. Moreover, the anti-DDT crusaders cause companies to be wary about spending a lot of money on research and development for new pesticides. An official of one company, who understandably does not want to be named, says: "If DDT is banned, you can be sure that related chemicals will be attacked, too, and in the same way. We have to take this into consideration when planning our research."

Of course, there are substitutes on the market now, provided that people are willing to pay the price. Many a farmer in Mexico, India, Brazil or other developing countries does not have the money to make such shifts.

The ironic thing, too, is that many of these substitutes are much more dangerous than DDT. Despite all the clamour about DDT, World Health Organization doctors insist that no research ever has definitely proved that DDT is harmful to human beings. Certainly, the compound under some conditions can be harmful to rats, to birds and to other forms of life. It could be harmful in some ways to humans. "To date, there is no evidence, however, to indicate that DDT is dangerous to humans," says Dr Frank C. Lu, chief of the food additive section of WHO.

### Dangerous substitutes

Not so with one suggested DDT substitute, parathion. This compound is so deadly that mishandling can cause catastrophe. In Algeria, so many people were dying through such mishandling that the government banned use of the chemical in agriculture. In 1967 in Mexico seventeen people were killed and 600 made ill when parathion contaminated bread supplies.

Is this the type substitute which anti-DDT crusaders think should replace DDT in developing countries? It might be well to note, too, that packaging of many chemicals has descriptions and explanations written in English, German or other languages of developed countries. Moreover, in many developing nations, the man who might use the pesticide may not know how to read even in his own language. Thus, it is imperative that any DDT substitute be not only inexpensive but harmless, or relatively harmless, to human beings, too.

It is evident that any analysis of the pesticide situation certainly indicates DDT is vitally necessary for the welfare of developing lands, and this is likely to be the case for some years ahead. No adequate substitutes are available. Accordingly, one might conclude that developing countries should ignore the campaign against

DDT in developed countries, and everything will be all right. That attitude overlooks some commercial and political facts of life. The banning of DDT in industrial nations can be expected to lead to more stringent inspection of foods coming into these countries. Developing countries continuing to use DDT may then find their food exports increasingly discriminated against.

Then, there are the political consequences. Authorities in rich countries will be telling their farmers that DDT is dangerous and must be avoided. Yet, in developing lands, farmers will be using those same pesticides. In such a situation, many people in developing countries may ask the question : If DDT is bad for people in rich countries, isn't it bad for us, too ?

If the banning then spreads to developing lands, dangerous substitutes might be forced into the hands of farmers and health workers. Needless deaths through mishandling then might occur. There could be additional political consequences, too, if DDT becomes another wedge in the cleavage between the have and the have-not countries. People in the poor lands undoubtedly would be much more reassured if rich nations were putting energy into finding suitable pesticide substitutes for DDT rather than trying to restrict its use or ban it entirely.

Necessity for such research is emphasized by nearly everyone cognizant of the problem. Even if there were no campaigns against DDT, the search for substitutes should be much further along than is the case. Many insects are developing resistance to DDT. "Resistance is the greatest single barrier to the completion of eradication programmes and to the maintenance of continuous control in the field of public health pests," says Dr Rajundar Pal of India, a biologist with WHO. He believes that the only practical alternative is the development of new insecticides that are both safe and cheap.

The ideal situation would be for DDT to be phased out over a period of five or ten years, while intensive research is devoted to finding substitutes. This research is so woefully inadequate at the present time that some foreign aid experts feel a crash programme should be launched. Such a programme could call for creation of an international consortium to finance a pesticide research effort.

Major industrial corporations in developed lands are becoming increasingly aware of their responsibilities toward developing nations. Undoubtedly, support from some of these companies could be enlisted in a crash programme to find new and safer pesticides which also would be cheap. Such corporations might be induced to establish manufacturing facilities in developing countries so that these nations will have better control of the pesticides they actually need.

Consortium research could focus not only on pesticides but also on other phases of development work, too. Take farm implements, as an example. Sometimes major international farm implement manufacturers are criticized because they devote most of their research to developing machines for farmers in prosperous countries, rather than on creating cheap and uncomplicated machines for farmers in less developed nations. Companies naturally are most interested in those areas where sales and profits are highest. But, developing nations undoubtedly would benefit if at least a few farm machinery development programmes would focus attention on requirements of farmers in developing countries.

Moreover, there are numerous other gaps in development aid research which are not being filled by any agencies. Ironically, agencies which have the most to do with handling developing nations assistance are among the most backward in fostering research directed at problems of those needy nations.

Today, a miracle rice yields bumper crops in the Philippines and southeast Asia, providing hope for many food-short nations of the globe. The variety was developed by the Ford/Rockefeller-financed International Rice Institute at Los Banos, Philippines. Najaah wheat which, because of its greater number of ears, survives on dry lands where other wheat dies for lack of moisture, was selected by FAO and developed by researchers at the American University of Beirut, Lebanon.

So it goes. In one area after another those agencies directly concerned with foreign aid have left research to philanthropic people, to universities and to regional or national organizations which frequently have little money for such tasks. Unfortunately, too many gaps do appear in that research. Moreover, better liaison is needed so that findings of the individual research agencies can be applied quickly to developing countries where the need for solutions is greatest.

The current furore over pesticides underscores another research gap which merits immediate attention. This has to do with research into integrated pest control ; the rational manipulation of all factors influencing the incidence and prevalence of pests (including physical, chemical, cultural and biological control methods).

In Greece, for instance, where the olive fly does up to \$40 million worth of damage annually, experiments are under way in the mass rearing of parasites that attack the flies and disdain the olives.

#### Natural warfare

Sometimes, crop scheduling can be revised to outwit insects. If the crop matures before the time when a certain insect reaches its annual population peak, predatory onslaughts of that insect may be minimized. One American drug company has developed a potent sex lure compound which attracts female cotton boll weevils. Experiments indicate the compound may bait traps which could attract and trap the female insects, eliminating the need for the heavy applications of DDT often used to control such insects.

In California, the leaf hopper *Dikrella* is now virtually immune to DDT. Yet this hopper is a major pest in grape vineyards. Ecologists found that a tiny wasp is a deadly enemy of the hopper. By breeding and releasing these wasps, which are harmless to man and crops, the *Dikrella* hopper is being controlled at a fraction of the cost of the DDT applications used heretofore.

World wide, farm chemicals and public health pesticides can contribute substantially in the fight against malnutrition and eradicable diseases. Even today, after years of malaria eradication work, 2.5 million people die from it every year. Moreover, with only two percent of the world's surface suitable for agriculture, the time is arriving when every ounce of food which can be squeezed from that land will be needed by an exploding population which is expanding  $2\frac{1}{2}$  times a life span.

The world needs sanity, not emotional crusades, as it faces the problems of malnutrition and disease.