environment

From our reporter at the National Biological Congress sponsored by the American Institute of Biological Sciences in Miami Beach

Environmental dilemmas of have-not nations

The underdeveloped nations face a dilemma in having limited funds for badly needed industrial development but at the same time wishing to pursue environmentally sound practices. To institute such practices tends to drive costs beyond the means of a population with low buying power.

While admitting this situation exists, Luis Chang Reyes of National University in Lima, Peru, points out numerous ways the developed countries make environmental protection difficult for the have-not countries. He expressed hope that the 1972 United Nations World Conference on the Environment would begin taking nations on a path to worldwide environmental standards.

The need for world standards is evident, he said, in the way the developed countries, while protecting their own environments, foist their problems on the have-not nations. The developed countries, for instance, export certain food products to have-not nations that lack the research and regulatory facilities that had prohibited the very same products in the nations of origin.

Likewise, he added, French nuclear tests appear to have caused a serious fish kill, as well as deformed fish, off the coast of Peru. And he said ocean dumping by developed nations has begun to contaminate the waters off Peru.

Incentives for alternative insecticides

There are many possible alternatives to the current widespread use of environmentally damaging broad-spectrum chemical insecticides: microbial agents, selective chemicals such as hormones and pheromones, predatory or parasitic organisms other than microbes, and such techniques as the sterile-male approach.

But there are formidable financial obstacles to industry in making such products commercially feasible. They include the unpatentability of microbials, the high cost of research and demonstration for narrow-spectrum chemicals, and the more limited markets for the highly specific approaches than for nonspecific pesticides.

H. T. Huang of International Minerals and Chemical Corp. in Libertyville, Ill., suggests various incentives—perhaps tax credits—to overcome these liabilities. In the case of microbials, he suggests that industry's load could be considerably lightened if the Federal Government would bear the cost of safety evaluation. Huang is more hopeful for specific chemicals. He believes they could possibly become a viable commercial venture under current conditions. "Major advances may be forthcoming in the near future," he says.

Promise and pitfalls of microbial insecticides

Selective microbial insecticides have had some success in the United States. *Bacillus thuringiensis* is effective against many caterpillars, a new virus promises to be successful against the cotton bollworm on a large scale, and Japanese beetles have been controlled by a bacterial disease for some years (SN: 9/19/70, p. 252).

There are hundreds more possibilities for the use of protozoan, bacterial, fungal or virus control of insects, reports Carlo M. Ignoffo of the U.S. Department of Agriculture. But as with so many other environmental problems, it is the transition period that is most difficult; changing from chemical to biological insect controls poses large initial problems.

For instance, said Ignoffo, farmers can expect somewhat lower crop yields during initial use of microbial agents because the microbials are not as fast-killing and persistent as chemical pesticides. However, an eventual resurgence of beneficial insects earlier killed by the chemical agents will likely offset the losses.

Another difficulty is that no clear-cut test protocols have yet been established for the safety of microbial insecticides. And herein lies another problem: The public is wary of any disease-causing organism even if it is a highly selective insect pathogen.

Other problems include chemical insecticide spray systems that would be highly wasteful of microbial material. The latter often should be sprayed in 50-micron droplets instead of the 300-micron droplets often used for chemical sprays.

PhoStrip for removing phosphorus

Gilbert V. Levin of Biospherics, Inc., Rockville, Md., reports a technique for removing phosphates from sewage that he says may considerably reduce the high costs and other liabilities of large-scale tertiary treatment. The technique, called PhoStrip, will soon be given a field trial at the Piscataway Plant in Maryland near Washington, D.C.

The technique is based on two research findings: First that by increasing the aeration rate of activated sludge, the bacteria in it can be induced to take up large amounts of phosphorus; second, the bacteria can be induced to yield up the phosphorus under anaerobic conditions.

The bacteria take up the phosphorus as a "luxury" nutrient, apparently due to a selection process that causes the process to take about two weeks after start-up to be fully operational.

In the process, organisms containing large amounts of the phosphorus they had earlier absorbed through the accelerated aeration are allowed to settle out of effluent in a secondary treatment basin. The effluent then is released almost free of phosphorus. Part of the resulting sludge is disposed of conventionally. The remaining sludge then is taken to an anaerobic tank which causes it to yield up its phosphorus into solution. Chemicals are then used to precipitate the phosphorus—much as in a tertiary treatment process—and the phosphorus-free sludge is recycled back through the process.

The system reduces the volume of material that must go through tertiary treatment to about 10 percent of the original. It also eliminates the need to use large amounts of sulfuric or hydrochloric acids to neutralize alkaline effluent produced by tertiary treatment with lime. Use of the acids, says Levin, results in release of sulfate or chloride ions—which could possibly cause severe pollution themselves. Sulfate ions are also released by tertiary treatment with alum.