Malaria and the green revolution

Malaria appears to be an unhealthy side-effect of the "green revolution." According to Georganne Chapin and Robert Wasserstrom of Columbia University, a resurgence of malaria is accompanying the introduction of heavy pesticide use to support intensive agriculture in the Third World. And a report of the problem, published in the Sept. 17 NATURE, is intended to administer at least a moderate slap on the wrist to the international officials responsible for letting this situation develop.

The dangerous link between malaria and agricultural practices that they document might have been quashed early, the scientists claim, had integrated-pest management (IPM) strategies (SN: 4/21/79, p. 266) been used instead of the now common practice of "blitzing" valuable pest-prone crops with insecticides alone. But IPM has yet to catch on in developing countries, the researchers told SCIENCE NEWS, because an inherent conflict-of-interest distorts agricultural-development policy set by research agencies of the United Nations and other influential multilateral organizations.

Only five to seven years ago, health officials in a dozen developing countries were lauding their own regional successes in eradicating entirely the mosquito-borne disease. Today, malaria is again on the rise, largely because the *Anopheles* mosquitos, which transmit *Plasmodium* parasites to humans, are increasingly resistant to chemical poisons. While acknowledging that "limited cases" of mosquito resistance have developed from using DDT and other pesticides in public-health drives to wipe out malaria, Wasserstrom contends that "by itself, public health uses of pesticides would not have caused the global malaria-eradication campaign to collapse" as it has. The reason, Chapin explains, is because "killing mosquitos in somebody's house and killing boll weevils in a cotton field do not require the same amount of chemicals. You need a whole lot more — probably in the thousand-folds more — to kill some boll weevils."

But over time, even crop pests like the boll weevil become resistant. And the typical response of farmers confronted with this has been just to increase the pesticide dose delivered. Where only a decade ago fields in Guatemala, Nicaragua and El Salvador were sprayed eight or nine times a season, "they must now be fumigated on as many as 50 occasions. Consequently," Chapin and Wasserstrom note, "the amount of pesticide which enters the local ecosystem has expanded at an increasing rate." In Nicaragua, for instance, between 1974 and 1976, DDT imports rose from 29,000 kilograms to 521, 600 kg.

And this can be devastating because a single application of DDT or similar pesticide has in some cases been "sufficient to reduce mortality (that is, increase resistance) among mosquitos by 80 percent," Chapin and Wasserstrom report.

As an indication of how serious the problem has become, they correlated DDT use in El Salvador with renewed malaria transmission and estimated that "at current rates, each kilo of insecticide added to the environment will generate 105 new cases of malaria." And it's worth noting that once insects develop a resistance to one compound, they frequently exhibit immunity to a range of unrelated poisons as well.

Ironically, the malaria problem stems largely from the intensive agriculture once seen as a potential solution to Third World hunger and disease. But the green revolution — development through genetics of highly productive crops — has indeed proved a mixed blessing (SN: 10/5/74, p. 218). New, high-yield cultivars often require expensive equipment, costly chemical fertilizers and — because they are frequently weaker, more prone to blight — pesticides.

As a result, the wealthier landowners usually have been the green revolution's Third World pioneers. And not surprisingly, these planters have concentrated on growing the more lucrative crops, frequently those with export potential. "In almost every major case of malaria resurgence, large landowners overuse pesticides on crops like cotton and tobacco which make no substantial contribution to the subsistence requirements of the rural poor," write Chapin and Wasserstrom. "Instead, income from such ventures is generally channelled into luxury consumption at home or speculative investments abroad."

The researchers' findings are "very obvious," Chapin told SCIENCE NEWS. "Once you start tracking it through and once you read it, it's so logical that it practically bowls you over. Indeed, every time we sent our paper out to entomologists and World Health Organization [WHO] officials for review, or to different journals, it would get rejected. And we'd get rejected with, 'Of course this is obvious. We already know this.' It's very interesting that something this 'obvious' has not been exposed before."

Every year-and-a-half or two years the UN convenes what it calls an ad hoc consultation — an expert panel to formulate policy — on pesticide use. Wasserstrom says that while there have been token references made by these policymakers to experimental successes with integrated-pest management use in the Third World, the gist of the final policy usually boils down to recommending that the UN teach farmers how to make more safe and effective use of pesticides. "I don't think we're in a position to say that the UN simply kowtows to the chemical companies," Wasserstrom says, "but it comes pretty close to that."

The Columbia research team says a major goal in publishing their article was to increase public awareness of how poorly they feel the present UN apparatus is handling a developing public-health crisis. As a follow-up, they plan to look at whether other parasitic diseases are staging epidemic resurgences similar to malaria's. If the answer is yes, their goal will be to explore what role, if any, pesticides—and ultimately the economic policy of world leaders — play. □

Worker in Philippines sprays for malaria-carrying mosquitos.

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