Man Versus Medfly: Some Tactical Blunders

An error in the laboratory may have caused California to release up to 100,000 fertile Medflies

Yielding to an ultimatum from Washington, D.C., California Governor Edmund G. Brown, Jr., agreed on 10 July to permit aerial spraying of an insecticide over a large swath of suburb around San Jose. Brown said the federal government "put a gun to my head" in its emergency campaign to wipe out a fast-spreading infestation of Mediterranean fruit flies. The insect has not established itself in the continental United States but has been found in small pockets of California for about a year. California's battle against the infestation accidentally spread the flies beyond the original problem area.

The Medfly, as it is being called, originated in West Africa, according to the California Department of Agriculture. From there it traveled west and south, appearing in Spain in 1842, then moving to France, Italy, Greece, and the Middle East. By 1901 it was in South America; by 1907, in Hawaii; by 1955, in Central America; and by 1972, in Mexico. At the summer temperatures in San Jose, the Medfly can pass through a generation (egg, larva, pupa, fly) in about 1 month. One female can lay 300 to 500 eggs—in laboratory conditions, up to 1000 eggs—before dying.

The larvae attack 200 varieties of fruits and vegetables that are grown in California, and so they pose a general threat to the state's $14 billion agricultural industry. Florida and Texas growers are worried, too. The Medfly's destructive potential is tremendous. American growers have beaten back several other Medfly invasions: in central Florida in 1929, in Miami in 1956, in Florida again in 1962, in Brownsville, Texas, in 1966, and in Los Angeles in 1975 and 1980. The infestation around San Jose has been in evidence since May of 1980, probably brought in on fruit from Hawaii, although the true source is not known.

Because the infestation seemed out of control, and because other states were panicking, Secretary of Agriculture John Block threatened to quarantine all suspect California produce beginning on 13 July if Brown did not permit aerial spraying. Brown was reluctant. Many of San Jose's 600,000 residents oppose spraying because they fear that the chemical to be used, malathion, might have unidentified and subtle toxic effects on humans and pets.

Earlier, Brown had ruled that aerial spraying was not necessary, a decision that went against the recommendations of the state and federal agriculture departments, the state farm bureau, officials from other states, and finally, against the advice of an ad hoc committee of technical experts convened by California's health and food officials. Brown's first decision came on 8 July. On the morning of 10 July, Block called a press conference to issue the ultimatum: spray or face a quarantine. Within 2 hours, Brown gave in, ordering aerial spraying to begin early in the morning on 14 July.

Why the sudden panic? According to two University of California scientists who consulted with Governor Brown on the crisis, the state learned just after the Fourth of July weekend that some supposedly sterile flies, released to interrupt the breeding cycle, may not have been sterile at all. Donald Dahlsten, head of the division of biological control in the department of entomology at the University of California at Berkeley, and Kenneth Hagen, another member of the department and one of the world's experts on fruit flies, give essentially the same account of events. Both served as consultants to the Governor's ad hoc technical committee.

The crisis began around 1 July when Medfly larvae were found in Mountain View, an area near San Francisco that had been free of the insects and was thought to be on the very outer edge of the infested zone. When 100 or so new nests of larvae were found there, officials were shaken because no one had trapped any wild Medflies in the area. How had the larvae got there? Was the monitoring system breaking down?

The answer appeared on 8 July, but only after panic had spread to Washington, D.C. Flytraps are used to catch samples of the enemy and trace the invasion routes. One of these traps caught something that should not have been there: a female Medfly colored with yellow dye, bearing fertile eggs in her abdomen. The yellow dye meant that this fly was one of a batch of flies bred in a commercial laboratory in Peru, treated with radiation to produce sterility, and sold to California along with millions of other similarly treated flies. Laboratories in Hawaii and Mexico have sent shipments to California as well, and the state has reportedly released hundreds of millions of sterile Medflies.

For nearly three decades sterile flies have been used against insects like the Medfly that mate only once before laying eggs. By saturating an infested area with sterile males, pest fighters can reduce the odds of successful mating to 100 to 1, for that is the ratio by which laboratory-bred flies outnumber the wild flies after their release. The wild females mate once with sterile males, lay sterile eggs, and die. At the same time, chemicals are sprayed by hand to kill larvae that would hatch from the ground to become the next generation. Thus the cycle is broken.

There is one catch. Even when laboratory flies are properly irradiated, a small percentage comes through without being sterilized. Most of these are males, for they are less vulnerable to radiation than female flies. (It would be best to produce no females in the laboratory, but it is too difficult to separate them out.) Even if a female is fertile after radiation treatment, however, she is most likely to breed with a sterile male and produce infertile eggs. For these reasons, finding a fertile Peruvian female with good eggs was significant. Traps are said to catch only 1 to 10

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percent of the flies in the environment. This suggests that perhaps as many as 100,000 Peruvian flies were improperly treated and then released in Mountain View. As a precaution, California has stopped using Peruvian flies for the time being.

When the scientists running the fly-release program checked their records, they found that Peruvian flies of the right vintage were released in Mountain View as a preventive measure in June. This led some to conclude that the Mountain View infestation was entirely a man-made event, not evidence that the flies had successfully evaded the ground spraying program.

Indeed, both Hagen and Dahlsten say that state officials were pleased with the way the eradication program was going in late June. Apparently the state was on the verge of declaring it a success when the new outbreak of larvae was spotted in Mountain View. Because officials are still a bit uncertain of the true dimensions of the problem, they have agreed to step up the attack by using aerial spraying. Hagen and Dahlsten think that this drastic measure is not necessary, although on this point they are at odds with most of the agricultural community.

The advantage of aerial spraying is simply that it is faster than other techniques. State officials have already been spraying the infested area with Medfly bait (a protein similar to the natural secretion of aphids, known as "honeydew," on which adult Medflies feed) mixed with malathion. When the flies hatch from the ground, they immediately look for a meal of honeydew; then they mate. The malathion kills them before they lay eggs. With aerial spraying, the pest fighters can move farther and faster against the Medflies, covering a 120-square-mile area (as they hope to do) with six fresh blankets of bait in one hatching period. The poison must be fresh, because it loses its potency after a few days in the sun.

The disadvantage of aerial spraying is that it is expensive and indiscriminate. In this case, large quantities of poison (though at lower concentrations per acre than in any previous case) will be sprayed over a suburban area, covering lawns, cars, pools, houses, and playgrounds. The poison can be washed off with water, and it breaks down in a relatively short time, but spraying it in the suburbs is not without risk.

There is no evidence that malathion spray poses a quantifiable health hazard to humans. One California state geneticist who specializes in toxicology, Kim Hooper, told *Science* that malathion is the "saccharin of pesticides." By that he meant that it may be hazardous, but the evidence is sketchy. At high concentrations, malathion produces evidence of doing some damage to DNA, the carrier of genetic information. But the statistics on this point, Hooper says, are "marginal," and the doses required are high. He thinks that for a native of San Jose, experiencing the air spray will be about as dangerous as breathing the indigenous automobile exhaust.

In addition, the Environmental Protection Agency (EPA) and the National Cancer Institute have given their approval of the aerial spraying plan. An EPA spokesman was quoted as saying that malathion is "perfectly safe to be used as directed" and that it "has never been on one of our hazardous chemicals lists." In the absence of any clear evidence that it will injure human health, the spraying program is likely to move forward without hindrance.—ELIOT MARSHALL

U.N. Grapples with Renewable Energy

The first global energy conference since the oil embargo will take place in Nairobi in August

When delegates gather in Nairobi next month for the United Nations Conference on New and Renewable Sources of Energy, it will be the first time in two decades that representatives from industrial countries, oil exporters, and Third World nations have met to discuss energy matters. The latest in a line of U.N. megaconferences that stretches back to the 1972 Stockholm meeting on the environment, it will be a massive talkfest aimed at spurring the development and use of renewable energy resources worldwide.

The Nairobi conference, dubbed UNERG in the absence of a pronounceable acronym of its own, is unlikely to follow the pattern set by previous global conferences, which have generally led to the establishment of new institutions or the launching of international funds to advance their causes. Instead, UNERG is expected to limit itself to exhorting individual nations to pay more attention to renewable energy and directing United Nations agencies to put more of their existing funds into renewable energy projects. A possible exception is in the area of research and development, for the conference will consider a proposal to support an international program to develop biomass technologies, perhaps including the establishment of an institute for research on fuelwood.

Unlike previous U.N. gatherings, UNERG has so far been relatively free from rancorous disputes between representatives of rich and poor countries over the structure of the international economic system. This is chiefly thanks to two developments. The scope of the conference has been tightly drawn to exclude some of the more contentious issues in global energy policy, and UNERG is neatly situated between two summit meetings at which relations between North and South will be the subject of political negotiation.

UNERG was set in motion by a vote of the U.N. General Assembly in December 1978, largely at the instigation of the government of Kenya. Its scope was set more or less by a process of elimination. Oil and gas were excluded because the OPEC nations would not have participated in a meeting to discuss global oil policy. Some of the richer developing countries argued that nuclear power should be included. But the General Assembly voted 43 to 42 to exclude it after the industrial countries, concerned about nuclear proliferation, objected. Coal was left out, according to some observers, because it is concentrated mostly in the industrial countries. And conservation was never seriously considered as a topic, much to the relief of the rich countries who feared that they would simply be castigated for their extravagant energy use.

Consequently, UNERG will focus on an array of 14 energy sources ranging

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