

defoliant. By removing the leaf cover in forests, the military can make observation of enemy troops easier. By killing crops, food can be denied them. Since 1961, it is estimated that one seventh of the land area in South Vietnam has been sprayed with one herbicide or another, though detailed figures are regarded by the military as classified information.

There is no question about the effectiveness of defoliation in Vietnam. It works. An assessment by the American Association for the Advancement of Science early this year asserted that one-fifth to one-half of South Vietnam's mangrove forests have been "utterly destroyed," and that perhaps half the trees in the mature hardwood forests north and west of Saigon are dead.

The AAAS report further noted that though adverse health effects in humans due to the use of herbicides in Vietnam cannot at this time be conclusively proved, there is real reason for alarm in the increase of stillbirths and deformities in newborn children which were coincident with large-scale spraying. In Tay Ninh, a very heavily defoliated province, stillbirths in 1968 and 1969 were at a rate of 64 per thousand. Saigon Children's Hospital had experienced a disproportionate rise in birth defects in 1967 and 1968. In a study commissioned by the National Cancer Institute, laboratory mice showed an increased incidence of abnormal fetuses at all but the lowest dosages of 2,4,5-T, and a level of dosage was found where 100% of fetuses would be deformed.

Bowing to the accumulating evidence, the government made a complete change of policy in April of 1970. The Secretaries of Interior, Agriculture, and Health, Education, and Welfare announced that new information had indicated that 2,4,5-T could produce abnormal development in unborn animals. Despite the Army's protest, the Deputy Secretary of Defense ordered the immediate suspension of the use of 2,4,5-T "pending a more thorough evaluation of the situation."

Within the United States, the registration of liquid forms of this herbicide was suspended by the Agriculture Department, making interstate sales illegal. Nonliquid forms were to remain on sale until hearings and possible appeals are completed. The ban did not affect the use of 2,4,5-T for control of weeds and brush on range, forest, pasture, and other non-agricultural land. It did affect its use around the home and on lakes, ponds, and ditch banks. In view of that order, it is difficult to understand the use of such a close relative of 2,4,5-T along the Rio Grande this summer.

Recapitulation

In summary, the facts seem to be as follows: that an agency of the federal government did cause the land on which Trotter's and Mayo's cattle were pastured to be sprayed; that in view of the known and suspected dangers of the chlorinated hydrocarbon family, this spraying was irresponsible; that Trotter and Mayo have suffered a substantial loss, the extent of which is at this writing not fully known; that their loss is the direct result of the use of this particular chemical under the conditions in which it was used.

The pressing question is the course which should be followed now. At least four things are indicated:

1) Compensate these ranchers. For the loss of cattle, the extra expense of feeding, telephoning, consulting specialists, having tests made. So much of their loss is obvious, but there

may be more, particularly if it develops that human beings have been seriously harmed. A careful assessment of the entire situation must be made, and compensation fixed accordingly.

2) Study the effect of the Bureau of Reclamation spraying on livestock, fish, and wildlife. What has been the effect on birds, on rabbits, on fish?

3) Reconsider the whole program of killing trees in the Rio Grande valley. Perhaps salt cedar is a great consumer of water. But does its eradication actually increase water for irrigation? And if it does, which is more in the public interest—salt cedar or more water?

4) After all the arguments are made, all the evidence in, all the alarms sounded, if it still is decided that the salt cedar must go, then find some other method than that which was used in San Acacio. Much, much more must be known about our agricultural chemicals, and this is especially true of the chlorinated hydrocarbons such as Silvex.

John Browne is pastor of the Presbyterian Church in Socorro, New Mexico. The Trotters, whose cattle were decimated by the Silvex spraying program, are members of his parish.

Silvex Causes Birth Defects

A scientist with the federal Food and Drug Administration (FDA) says laboratory tests reveal that the herbicide Silvex causes birth defects in both chickens and hamsters. In a telephone interview November 17 with the *Review*, Dr. Jacqueline Verrett said that her laboratory tests definitely show Silvex to be teratogenic (an agent causing birth defects). It was Dr. Verrett who revealed two years ago that cyclamates can cause cancer.

Silvex is a close chemical relative of another herbicide called 2,4,5-T (short for 2,4,5-trichlorophenoxyacetic acid). Silvex is sometimes, in fact, called 2,4,5-TP (short for 2,4,5-trichlorophenoxy propionic acid). Both compounds, Silvex and 2,4,5-T, are manufactured starting with the same basic substance, 2,4,5-trichlorophenol.

Silvex was the chemical which the Bureau of Reclamation admits to having sprayed along the Rio Grande River near Socorro, N.M. (see story). Both cattle and humans were inadvertently sprayed during that incident. Several of the cows were pregnant at the time and have subsequently given birth to deformed and dead calves.

The teratogenic effects of Silvex and 2,4,5-T were the subject of testimony before a subcommittee of the U.S. Senate in June, 1970. At that time two of Ralph Nader's consultants, Mr. Harrison Wellford and Dr. Albert Fritsch, told Senator Philip Hart's Subcommittee on Energy, Natural Resources and the Environment that 2,4,5-T should be banned from use because "there is considerable evidence that 2,4,5-T is dangerous to human beings and that it presents an immediate hazard to the public." They also said that Silvex should be banned because it is "chemically so similar" to 2,4,5-T. Until Dr. Verrett's statement of Nov. 17 to the *New Mexico Review*, however, there have been no public confirmations that Silvex causes birth defects in laboratory tests.

A controversy has been raging in Washington for over two years regarding the ability of 2,4,5-T to cause birth defects. On October 29, 1969, Dr. Lee Dubridge, President Nixon's science advisor, announced that the U.S. Department of Agriculture (USDA) would cancel the registration of 2,4,5-T. Subsequently, however, President Nixon refused to support Dubridge in his statement. The proposed ban fell apart. Dow Chemical Co., the major manufacturer of 2,4,5-T, brought forth evidence that the teratogenic (literally, "monster-producing") agent was not 2,4,5-T itself but an impurity which is created in 2,4,5-T during the manufacturing process. This impurity is called 2,3,7,8-tetra-chloro-dibenzo-*P*-dioxin—and it is usually called just dioxin or TCDD. Since there are numerous dioxins the most accurate short term for this particular agent is TCDD.

According to Dow Chemical, TCDD is one of the most highly teratogenic agents ever discovered. The FDA has verified these findings; in FDA labs TCDD has been shown to produce birth defects in chickens and hamsters at levels 100,000 to 1,000,000 lower than the amount of thalidomide causing birth defects in the same animal test systems.

Testifying before Senator Hart's subcommittee, Dr. Albert Fritsch described the manufacture of both 2,4,5-T and Silvex, pointing out that the potent teratogen, TCDD, is created at a stage in the process when 2,4,5-T and Silvex are identical. Thus both 2,4,5-T and Silvex can be expected to appear on the dealer's shelf contaminated by TCDD. Dr. Verrett of FDA confirmed this in her interview with the *Review* on Nov. 17. "When we look for TCDD in each of these agents, we always find it," said Dr. Verrett.

Dr. Verrett also pointed out, however, that 2,4,5-T and Silvex have been shown to produce defects even after chemical purification to remove the potent TCDD. She said that her laboratory has gone to considerable trouble to purify both 2,4,5-T and Silvex and to test the purified substances. "They test positive without the TCDD impurity," she asserts. "Even purified Silvex causes deformed beaks and legs in chick embryos," says Dr. Verrett, "and it also causes an increase in fetal mortalities."

On April 15, 1970, the Surgeon General of the United States announced that a series of tests by the National Institute of Environmental Health Sciences (NIEHS) had confirmed earlier studies conducted by Bionetics Laboratory under contract with the National Cancer Institute. The new studies confirmed that 2,4,5-T causes birth defects even when it is purified. In a joint statement with the Secretary of Health, Education and Welfare on April 15, the Surgeon General and the Secretary of Agriculture announced cancellation of registration of 2,4,5-T for all uses around the home, for all uses in lakes, ponds and ditch-banks, and for all uses in food crops. Cancellation of a registration—as opposed to suspension of a registration—involves a lengthy series of hearings and court proceedings. Today, more than 19 months after the cancellation, 2,4,5-T is still in use and is still for sale on dealers shelves. The registration for Silvex—despite its chemical similarity to 2,4,5-T—has never been cancelled.