Defense Issues Summary of Defoliation Study

The Department of Defense has released a "summary digest" of a report designed to assess the ecological impact of herbicides used for defoliation and crop destruction in Vietnam. The 4½-page summary minimizes the possibility of adverse effects and states that herbicides are ecologically "beneficial" in some instances. It also acknowledges that "relevant scientific studies in this area were found to be very scanty."

The digest summarizes a 369-page "state-of-knowledge" survey prepared by the Midwest Research Institute (MRI) under a $62,000 contract with the Defense Department's Advanced Research Projects Agency. The MRI report, which was prepared between 15 August and 1 December, was based on a review of more than 1500 articles in the scientific literature and on "information contacts" with more than 140 knowledgeable people in government, universities, and the chemical industry.

The Pentagon's summary states that enough herbicide was used in Vietnam in 1967 to "treat" 965,000 acres, but since many areas were retreated, "the total defoliated area was significantly less." In comparison, according to the summary, about 120 million acres of U.S. cropland were treated with herbicides in 1965. The summary does not indicate the relative concentrations of herbicides used on acreage in this country as opposed to the concentrations used in Vietnam.

Three basic herbicides have been used in Vietnam, the summary says: one is a 50:50 mixture of *n*-butyl esters of 2,4-D and 2,4,5-T, used in jungle defoliation; another is a combination of picloram and 2,4-D in a low-volatile amine formulation for woody-plant control and use in areas in which accurate placement of spray is essential; and the third is cacodylic acid, a contact herbicide for grass control and destruction of rice crops used by the Viet Cong. The summary notes that "only a few scientific reports are available from the areas of operational use in Vietnam as to vegetational response to the defoliation chemicals, although there are many operation reports as well as observations by qualified personnel." The conclusions of the MRI study are consequently based primarily on research outside Vietnam.

The Pentagon's summary states that "ecological changes caused by herbicides at the current rate of use have in no measure reached the proportion of ecological disturbance" caused by man's use of fire, the ax, and the plow to clear land and enhance agricultural productivity. The summary lists six conclusions:

1) "Destruction of vegetation is the greatest direct ecological consequence of using herbicides. . . . Secondary growth or replacement vegetation invades rapidly under the tropical conditions of Vietnam, and partially killed or defoliated trees exhibit rapid recovery."

2) "Long term effects on wildlife may be beneficial or detrimental. In many temperate zone areas, herbicidal treatment of forest has improved the wildlife habitat and favored animal production through increases in wildlife food plants. Destruction or modification of the habitat may greatly influence fauna that are rare or in danger of extinction. . . . Animals such as the rare kouprey, an ancestral bovine, may be favored by the increase in bamboo and grasses following defoliation." However, the summary acknowledges that "many unknown factors, including feeding habits of many indigenous animals, make specific effects on wildlife difficult to predict."

3) "Herbicides now in use in Vietnam will not persist at a phytotoxic (poisonous to plants) level in the soil for long periods."

4) "The possibility of lethal toxicity to humans, domestic animals or wildlife by use of herbicides is highly unlikely. Direct toxicity hazard to people and animals on the ground is nearly nonexistent."

5) "Unlike many insecticides, herbicides seldom persist in animal or insect tissues. Transfer of herbicides to the next animal in the food chain on defoliant-treated areas is negligible. Most herbicides, including all of those used in Vietnam, are readily excreted and do not accumulate in the animal body."

6) "Indirect effects of herbicides resulting from destruction of aquatic vegetation may produce changes in the biota of the aquatic environment. Direct toxic effects on fish and aquatic organisms are negligible. Destruction of specific plants used for fish foods will lead to changes in the food chain of the aquatic ecosystem. Application of herbicides to remove floating aquatic weeds will provide important benefits because their presence depletes the oxygen content of the water."

The Pentagon's summary states that "reliable judgments could not be made with respect to the effect of defoliants on water quality, on mammals and birds in danger of extinction, on climate and the hydrologic cycle, or on soil erosion."

The MRI study was commissioned after the AAAS and other scientific groups had expressed concern over the impact of large-scale use of herbicides, especially in Vietnam. The Defense Department submitted the study for evaluation by an *ad hoc* committee of the National Academy of Sciences–National Research Council chaired by A. Geoffrey Norman, vice-president for research at the University of Michigan and chairman of the National Research Council's biology and agriculture division. Norman was a biochemist and division chief for the Army Chemical Corps Biological Laboratories at Fort Detrick, Maryland, from 1946 to 1952. The Norman committee received portions of the MRI report on 8 November and received the full text at the end of the first week in December. The committee completed its work and submitted its analysis of the MRI report to the Defense Department on 1 February. Both the MRI report and the Academy's analysis of it will be further evaluated by a new AAAS Committee on Environmental Alteration, headed by David Goddard of the University of Pennsylvania. The Defense Department said it plans to release the MRI and Academy studies next week.

—PHILIP M. BOFFEY