DDT Spray and Bird Mortality

The report "Bird mortality after spraying for Dutch elm disease with DDT" [C. F. Wurster, Jr., D. H. Wurster, W. N. Strickland, *Science* **148**, 90 (1965)] provides data in greater detail than has been offered in previous papers on that subject. The study of a control or reference area 1 mile distant from the spraying has helped to show that bird mortality is largely confined to the treated area. In drawing conclusions from such studies, however, the rate of application of the insecticide is crucial. In this instance, the authors report that 2300 elms were sprayed with 1285 lb of DDT by means of a Rotomist. The resultant dosage rate is expressed as 1.9 lb per acre, although it is acknowledged that the dosage "varied widely because of uneven elm distribution." Since the usual recommended rate by mist-blower application is 2 to 3 lb of DDT (active material) per acre, one wonders why such a reduced rate was used. The average dosage per tree appears to have been 0.56 lb, yet the bird mortality reported resembles that observed on the University of Maine campus after all elms were treated with DDT at the rate of 2 to 3 lb per tree.

It is common practice to present figures relating to Dutch elm disease control calculated on a wide-area basis. Such figures are grossly misleading to the casual reader, and result in much confusion by the time the information filters down to the public. Many people now believe that when a farmer applies DDT uniformly at the rate of 1 lb per acre disastrous losses of birds and other wildlife follow. Some individuals have been led to believe that DDT applications at 0.5 lb per acre or less likewise result in serious losses of birds. More realistic figures will be obtained if one calculates the land area occupied by a single mature elm tree and assumes that this target area is to receive 2 to 3 lb of DDT. I suggest that where the trees are isolated or widely spaced the resulting rate per acre might range between 25 and 50 lb. Considerably higher rates would be expected in areas where the stands of elms are dense; one such area on the University of Maine campus yielded a calculated dosage rate of 90 lb of DDT per acre. It is true that all of the insecticide does not come to rest in the target area; nevertheless, the dosage normally applied is substantially higher than 1.9 lb per acre. Data obtained by the U.S. Fish and Wildlife Service as well as the U.S. Department of Agriculture prior to 1950 indicated that single applications of DDT at or exceeding 4 lb per acre could result in marked mortality to birds.

IVAN N. MCDANIEL
Maine Agricultural Experiment Station, University of Maine, Orono

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McDaniel suggests that very high DDT concentrations are localized and that effects on birds are restricted to these areas. Hanover was sprayed by a well-known tree-care company according to the company's usual specifications. Uneven elm distribution certainly results in local DDT concentrations well above the average of 1.9 lb per acre, though we doubt the figure gets as high here as those McDaniel suggests. To some extent, the normal feeding range of birds tends to nullify the effect of unequal DDT distribution. In any case, bird mortality in Hanover was not restricted to areas of highest elm density, but occurred throughout the town. We have no evidence, however, that *direct* mortality extended as much as ½ mile beyond the sprayed area.

It may be that sublethal effects of DDT and certain other pesticides have a still greater overall impact on avian populations than does direct mortality. Sublethal amounts of DDT and some other chlorinated hydrocarbons seriously inhibit reproductive success in bobwhite and ring-necked pheasants (*1*). The tissues of most wild birds analyzed, including gonads and eggs, contain residues of chlorinated hydrocarbons. Strong circumstantial evidence has now linked chlorinated hydrocarbon residues with reproductive failure in field populations of osprey (*2*), woodcock (*3*), bald and golden eagle (*4*), peregrine falcon (*5*), and others (*6*). Sharp declines in population are reported among some of these species on both sides of the Atlantic. Nesting failure is insidious and difficult to investigate in the field, however, and the effect can go unnoticed until a severe population decline has occurred.

We therefore cannot agree that applications of ½ or 1 lb of DDT per acre, even when uniformly applied, do not affect birds. Both laboratory and field data strongly suggest that reproductive inadequacy related to chlorinated hydrocarbon residues is a major problem among many avian species. More research is urgently needed to confirm or deny this relationship.

CHARLES F. WURSTER, JR.
DORIS H. WURSTER
Dartmouth College and
Dartmouth Medical School, Hanover, New Hampshire 03755

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