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## DAMAGE SURVEYS IN OHIO AND MICHIGAN

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Blackbirds, Red-winged Blackbirds in particular, have caused millions of dollars worth of damage to corn crops in Ohio and Michigan and throughout the country. Concentrated efforts to estimate and document the damage in Ohio and Michigan were initiated in the fall of 1966. Besides yielding an annual estimate of blackbird damage, it was hoped that the survey would eventually be held to establish the effectiveness of control efforts, particularly the use of Avitrol. However, the large variability inherent in the damage sampling procedure has precluded documentation of changes in the amount of damage due to control efforts. In order to detect such changes, either a much larger sample would have to be taken or control efforts throughout Ohio and Michigan would have to be increased significantly. Agencies which cooperated with the Bureau of Sport Fisheries and Wildlife in conducting the survey were the Ohio Department of Agriculture, the Ohio Agricultural Research and Development Center, and the Ohio Cooperative Extension Service.

In 1966, when the annual damage survey was initiated, Dr. C.R. Weaver, Statistician at the Ohio Agricultural Research and Development Center in Wooster, Ohio, drew up a number of sampling plans, balancing cost against desired precision. The plans allowed for varying combinations of the number of sample fields per area and the number of sampling points (or stations) per field, for high damage, moderate damage, and light damage areas. Alternatives for the high damage areas included (1) 500 fields with 2 stations per field, (2) 775 fields with 2 stations per field, and (3) 235 fields with 10 stations per field. For the moderate damage areas, the alternatives were (1) 441 fields with 3 stations per field, (2) 115 fields with 3 stations per field, and (3) 235 fields with 10 stations per field. The light damage alternatives were (1) 300 fields with 3 stations per field, and (2) 81 fields with 3 stations per field.

Naturally, the combinations which included the greatest number of sample fields and the largest number of stations per field would yield a more precise estimate of the actual damage than combinations of fewer fields and fewer stations. However, cost and available manpower also had to be considered in making the final decision on which combination to choose, so the combination which was eventually decided upon was not necessarily the most precise alternative offered.

Representative of a high damage area, the Lake Erie Region, which consists of Erie, Huron, Lucas, Ottawa, and Sandusky Counties in Ohio, as well as Monroe County in Michigan, has been sampled using the combination of 500 fields with 2 stations per field. Ohio's West Central Region, which includes Auglaize, Logan, and Mercer Counties, Northeast Region, which includes Ash-tabula and Trumbull Counties, and Southwest Region, which includes Butler and Hamilton Counties, as well as Michigan's Central Region which includes Bay and Mason Counties, were considered to be moderate damage areas, and have been sampled using the combination of 115 fields with 3 stations per

field. Representing a light damage area, Ohio's Central Region, which includes Coshocton, Fairfield, Franklin, Licking, Muskingum, Perry, and Pickaway Counties, has been sampled using the combination of 300 fields with 3 stations per field.

Fields to be sampled are located by dividing each region into consecutively numbered square mile blocks on county road maps. The identification number for each block in which a field is to be sampled is then selected from a table of random numbers and the appropriate block is marked on the map grid. The first field encountered upon entering each marked block is the field to be sampled. Areas such as cities and large bodies of water are not included in the sample possibilities. When no cornfields can be found in a chosen block, the worker proceeds to the block immediately to the north. If no field is found there, he proceeds clockwise through the blocks surrounding the marked block until a field is located.

Upon arriving at a field to be sampled, the worker locates each sampling station by choosing two sets of numbers from a table of random numbers. One number represents rows of corn, and the other the number of steps down the row. When the worker arrives at the station location, he examines 10 consecutive ears of corn (one per stalk), estimating and recording the percentage of actual, or primary, blackbird damage sustained by each ear. Percent of damage is recorded in increments of 1 from 0 to 5 percent, increments of 5 from 5 to 30 percent, and increments of 10 from 30 to 100 percent. If the sampled ear contains secondary damage (molding or sprouting damage) this is also recorded on the form.

At the conclusion of the survey which usually consumes approximately 100 man-days, the data are organized and delivered to Dr. Weaver for analysis on the ARDC computers. The computer prints out the mean percent of blackbird damage per county, region and State, but also the total corn acreage, potential corn yield before blackbird damage, actual yield, the number of bushels lost to blackbirds, and the value of corn lost in each county, region, and State.

Due to the large variance inherent in the sampling procedure, it is difficult to make definite statements about annual changes in the damage figure, such as "the damage in 1969 was five times that of 1971," without running statistical tests on the data. We have always felt the time and cost involved in running this statistical analysis would be prohibitive, so any comparative report on the damage figures must, of necessity, contain a large number of "apparently" and "seemingly." We do feel, however, that some general statements can be made concerning blackbird corn damage in Ohio and Michigan.

The amount of blackbird corn damage is probably less than one percent of the crop annually in both states. One-half or one-third of one percent is, in fact, a more realistic figure. These figures are misleading, though, because they represent the average (or mean) amount of damage state-wide and do not represent the true damage picture. Damage is not evenly spread over the state; a large percentage of farmers receive little or no damage at all while a smaller percentage receives moderate damage. A still smaller percent receive very heavy damage, up to 70 to 80 percent of the crop in some cases. These farmers need help. They need good, effective, damage control methods. Furthermore, although damage may only be 4/10 of one percent as it

was in 1972 in Ohio, this still represents a state-wide loss of just under 1,000,000 bushels. At today's corn prices that represents a significant amount of money out of the farmers pocket and out of all our pockets due to resulting higher food prices.

This past summer we decided that the time had come to determine if our initial reasons for having an annual damage assessment were still justified, and to re-evaluate the need for the yearly survey. In looking over the data for the past three years in both Ohio and Michigan, we find that the average percentage of blackbird damage has apparently changed very little on an annual basis. This average annual percent of damage in Ohio, for instance, ranged between 2/10 of one percent and 4/10 of one percent over the three years, while in Michigan average damage has stayed practically constant at 1/4 of one percent for the past three years. We feel that unless a very significant change in blackbird damage develops or a revolution in blackbird control methods occurs, these figures will probably be fairly representative of the damage picture for some time to come. Therefore, we have decided not to undertake a damage assessment in 1973. A decision on future damage assessments will be made at a later date.