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The problem of pheasants (*phasianus colchicus*) pulling sprouting corn in the U.S. is not well understood, because objective surveys have not been conducted. However, a subjective survey by Stone and Mott (1973) indicated the problem is substantial. They estimated losses of corn in five states (IA, ID, IN, KS, and NE), where pheasants were reported as the only bird causing losses, at 7 million bushels ($17.5 million at $2.50/bu). Their survey data are reinforced by estimates that a cock pheasant is capable of consuming an amount of sprouting corn that would yield 15 bushels when mature (West 1968) and by estimates of spring pheasant populations as high as one pheasant per five acres in some areas of some states such as eastern and southeastern Iowa (Ronald George, pers. comm.).

In 1967, West, et al. (1969) conclusively demonstrated that a latex slurry formulation of 0.5% methiocarb protected sprouting corn from pheasant damage in South Dakota---22 times as many sprouts were destroyed by pheasants on untreated fields as treated ones. German researchers, informed of these data, have used methiocarb to protect commercial fields of sprouting corn from pheasants since 1969. In Germany, such adhesives as skim milk and beer have been used to adhere methiocarb to the corn seed (Hermann and Kolbe 1971; Hermann, pers. comm.). Neither the latex slurry formulation nor the use of the adhesives used by the Germans have been acceptable to U.S. corn growers. With ease of treatment and planting in mind, the Chemagro Division of Mobay Chemical Company developed a graphite formulation containing 50% methiocarb (Mesurol 50% HBT) in 1973. In February 1976, this formulation was federally registered by the EPA (Registration No. 3125-309) for protecting sprouting corn from damage by blackbirds in all states east of the Mississippi River.

Based on the study of West, et al. (1969), it is logical that Mesurol 50% HBT should have similar value for protecting sprouting corn from pheasants. The first appraisal of Mesurol 50% HBT on pheasants (in South Dakota) indicated that the HBT formulation was not as effective as the latex slurry formulation. However, pheasants still pulled 3 times as many sprouts in untreated test fields as in treated ones, and plant numbers were about 20% greater in treated fields than untreated ones (Besser and Lewis 1975). On fields yielding 50-100 bu/acre, the treatment benefits were computed to be $25-50/acre (at a market price of $2.50/bu).

From the above information, it appeared to us that further studies could lead to the addition of pheasants to the Mesurol 50% HBT label for blackbirds and to the extension of the geographic availability of the product to states west of the Mississippi River (where 49% of U.S. corn for grain was grown in 1974). Such studies were conducted in Iowa in April and May 1976 and in South Dakota in May and June 1976. Seed corn treatments of 0.5% and 0.25% (1.0% and 0.5% Mesurol 50% HBT) were appraised in the Iowa and South Dakota studies, respectively.

METHODS

Field Selection and Treatment

Ten fields in Keokuk County, Iowa and eight in Brown County, South Dakota, where male pheasants had been observed feeding before planting, were chosen as test fields. In Iowa, test fields were accepted only if a cock pheasant was accompanied by one or more hens and was sighted on two consecutive visits. Field sizes were 4 to 12 acres in Iowa and 10 to 23 in South Dakota. Entire fields were used as test fields in Iowa and 8- to 12-acre portions of fields were used as test areas in South Dakota. One half of the growers of test fields in each state were given a measured quantity of Mesurol 50% HBT to add to each of their planter boxes, sufficient to treat the desired area at the desired level.

Bird Observations and Damage Assessment

Each of the test fields was observed for 10 minutes daily after sprouts began to emerge---five minutes between daybreak and 1000 hours and five minutes between 1700 hours and darkness. The route monitoring test fields was run 23 times between May 14 and May 25 in Iowa and 11 times between May 27 and June 3 in South Dakota. The point from which the male pheasant on each field most frequently emerged from cover was marked with a garden lath. This point was established as the hub of a rectangular 1-acre experimental unit on

which pheasant damage to sprouting corn was assessed. An experimental unit was that area encompassing the outer 16 rows of each test field, extending 454 feet in each direction from the lath marking the center of the male's territory.

Ten survey plots (observational units), each consisting of 100 linear feet of corn row (0.007 acres), were randomly established within each 1-acre experimental unit in each test field. The number of seedlings destroyed by pheasants were counted on each survey. Two to four interim damage assessments were conducted in each unit three to seven days postemergence. To prevent duplicate counts of damaged sprouts, seed hulls and severed plants were removed during each survey. The final survey was conducted on each test plot from seven to nine days postemergence. The number of remaining, undamaged seedlings also was recorded during the final survey. Data for the percentage of seedlings destroyed by pheasants were converted to arcs in and analyzed as a completely random design using analysis of variance.

RESULTS AND DISCUSSION

Iowa Study

Pheasants were responsible for all the seedling mortality recorded. They destroyed 12.0% (15.3 ± SE 35.6) of the plants on the experimental units in untreated fields and 3.2% (40.4 ± SE 15.8) of the plants on the five experimental units in treated fields -- about 3.8 times as many on untreated fields. The difference between treated and untreated units was significant (P=0.016). An average of 1,212.8 (± SE 70.5) seedlings survived per treated unit compared with 1,125.4 (± SE 92.9) seedling per untreated unit. This 7.8% difference corresponded closely to the 8.8% difference in percentage of seedlings destroyed by pheasants on test units. The difference in percentage of seedlings surviving, being the reciprocal of the percentage destroyed by pheasants, was also significant at the same probability level (P=0.016).

Approximately equal numbers of pheasants were observed in test fields---19 in untreated fields and 18 in treated fields. With 10 test fields spread over two townships, it was seldom possible to arrive at fields during the morning and evening periods when the greatest feeding activity and damage to sprouting corn occurred. Also, arrival of the observer frequently caused pheasants, particularly hens, to stop feeding and seek cover. Only 0.79 pheasants were counted per observation during 131 valid observation periods of individual test fields---0.84 per observation per untreated field and 0.74 per treated fields.

Two weeks after planting, a sample of corn seeds was collected from one treated field and analyzed for methiocarb residues by the method of Cunningham and Starr 1973). This sample contained 208-297 ppm methiocarb plus 63-83 ppm of methiocarb sulfoxide, a primary metabolite. This residue level is about 94% less than the theoretical amount applied, but still enough to be detectable by pheasants. Rainfall at this site totaled at least 1.4 inches during this period.

South Dakota Study

Before planted corn sprouted, pheasants abandoned three of the eight test fields---all three were treated fields. The criterion of having hens accompany cocks on selection of test fields, as was done in Iowa, proved to be a vital one for successful appraisal of the treatment. Therefore, data were available from only one treated and four untreated fields, and no valid conclusions could be made.

Pheasants destroyed 216 (± SE 129) seedlings per untreated experimental unit and 163 seedlings in the 0.25% methiocarb-treated unit. At least 19 pheasants visited the four untreated fields, and at least four visited the treated field. An average of 1.1 pheasants were recorded per observation in the four untreated fields and 1.3 pheasants in the treated field.

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