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BIRD DAMAGE APPRAISAL METHODS IN SOME AGRICULTURAL CROPS

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For more than a decade, personnel of the Section of Bird Damage Control at the Denver Wildlife Research Center have studied agricultural damage by birds. Much of their research has centered on evaluating damage reduction efforts, and in doing this, they have developed and used many damage appraisal methods. This paper outlines briefly those that have been published. It is hoped that these methods will provide other workers with a useful starting point for evaluating bird losses in other test situations or in other surveys over extensive areas. The reader is cautioned, however, that bird damage appraisal is very complex, and in planning sampling designs, the advice of a good agricultural statistician, or at least attention to a good statistical textbook, is important to prevent a wasted effort.

SPROUTING FIELD CROPS

Corn

Damage to fields ranging from 0.8 to 40 acres in size was evaluated by counting normal sprouts and bird-damaged or destroyed sprouts on from 15 to 100 subplots. Subplots usually consisted of a 100-foot section of two adjacent rows (0.016 acre) and were located randomly except in one instance in which they were allocated to field edges and centers at a ratio of 9:1 because bird damage (by pheasants) was stratified. The average number of plants lost per field and the average percentage lost were determined at various intervals after damage began. (Sources: West 1968; West and Dunks 1969; West et al. 1969; Guarino and Forbes 1970; Frank et al. 1970; Stickley and Guarino 1972.)

Rice

Several 1-acre field plots were each gridded into 100 0.01-acre subplots, and a center point for a 1-square-foot circle was randomly chosen within each subplot. Rice seedlings within 6.77 inches of the center point were counted at intervals after damage began and the total plants per field plot estimated. (Source: Besser 1973.)

MATURE FIELD CROPS

Corn

Extensive areas (up to 24 states) were surveyed by examining randomly located fields after the corn had dented (and most damage had stopped). Generally, one to four randomly located subplots, ranging in size from one 15-foot section of a row to one 200-foot section of a row, were selected in each field. (In a recent survey, one 100-foot row was found to be the most efficient.) The number of damaged and undamaged ears were counted, and on damaged ears, the average lengths of damaged and undamaged kernel rows were measured to the nearest 0.1 inch. These lengths were converted to bushels per acre of corn lost by using a mathematically generated table. A bias in the table may somewhat underestimate damage, and this is now being checked. (Sources: De Grazio et al 1969, Stone et al 1970, Stone et al 1971, Stone and Mott 1973.)

Peanuts

Thirty randomly located fields were surveyed, and four subplots, each consisting of a 10-foot-long section of a peanut windrow, were randomly selected in each field. The number of pods opened by birds and the number of pegs where pods had been removed by birds were counted and used to calculate average losses per acre. (Source: Mott et al 1972.)

Rice

Bird damage to experimental rice was evaluated in relatively small plots (7 x 7, 6 x 6, or 4 x 4 feet). From 10 to 20 rice panicles, clipped 1 inch below the first primary branch, were randomly collected in each plot. Average weight, number of missing or "milked" kernels, and percentage of kernels damaged were calculated. Total plot yield was also determined by harvesting. (Source: DeHaven et al 1971.)

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FRUIT CROPS

Cherries (Control Evaluation)

In randomly selected trees, 50 cherries on the tip of each of eight randomly selected branches were counted and marked off before damage began. Branches were stratified; two were selected for each compass direction (N, S, E, and W), one above and one below the midpoint of the tree. The number of marked cherries damaged or removed by birds and the total percent damage were determined at intervals before harvest. (Source: Guarino et al. 1974a,b.)

Cherries (Extensive Survey)

One tree was selected (by a weight randomized scheme) in each of 100 orchards. One terminal branch was randomly selected in each tree, and all green cherries on the branch were counted before damage began. At 3 to 5 days before harvest, all cherries were stripped from the marked branches, the total number of cherries and the number pecked were determined, and these results were compared with predamage counts to calculate percent loss. (Sources: Michigan Crop Reporting Service 1972; Stone 1974.)

Blueberries

Blueberry bushes (selected randomly in one test and along a line transect in another) were chosen for subsampling in plantings ranging from 0.5 to 8 acres in size. Damage estimates were based on percentage losses (by actual count) to groups of 10 ripe berries on each bush. In one test, berry groups were selected and marked before damage began; in the second, damage had started, and marked branches were thinned to 10 undamaged berries. (Sources: Bollengier et al. 1974, Stone et al. 1974.)

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BIRD DAMAGE TO WINE GRAPES IN CENTRAL CALIFORNIA, 1973

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ABSTRACT: Bird damage to wine grapes was surveyed in nine counties in the coastal area of central California in 1973. Damage to 90 bunches of grapes in each of 140 randomly selected plantings was visually estimated according to seven damage classes. Results indicated that birds damaged or destroyed 1.99% ± 1.08% (95% confidence interval) of the crop, or about 1,547 to 5,219 tons of grapes worth more than $0.75 million. Napa, San Benito, and Sonoma Counties had the highest dollar losses. Upper bunches on grapevines were more heavily damaged than lower ones, and dark-colored varieties were more heavily damaged than light-colored ones. Early-maturing and late-maturing varieties were not differentially damaged. Of the birds observed in the sampled plantings, 51.5% were house finches (Carpodacus mexicanus) and 25.8% were starlings (Sturnus vulgaris); 16 other species made up the remaining 22.7%. Modifications of the survey methods are suggested for similar surveys of bird damage to grapes and for surveys where higher accuracy is desired.

Early in 1973 a questionnaire survey was conducted by Crase and DeHaven (1973) on statewide bird damage to raisin, table, and wine grapes in California. The results indicated that damage was widespread but was most severe in wine varieties grown in the coastal counties of central California. To more accurately assess losses to wine grapes and to help set bird damage research and management priorities, a survey of bird damage was conducted during the 1973 grape harvest with the help of County Agricultural Commissioners in nine of these coastal counties. The results are reported here.

METHODS

A list of about 5,000 wine-grape plantings, which represents all bearing plantings in the nine counties, was provided by the California Crop and Livestock Reporting Service, and 290 were randomly chosen for sampling. For each planting, we obtained the size, location, variety, year planted, and name and address of the grower, then wrote the grower requesting a sketch of the exact planting location, expected harvest date, and permission to enter the planting. About 78% (226) of the growers responded, and 140 of their plantings (about one planting for each 336 acres grown) were sampled as time permitted. The number of plantings sampled in each county was roughly proportional to the county's bearing acreage (Table 1). The total area sampled was 47,107 acres, about 32% of California's bearing wine-grape acreage and about 10% of its total bearing acreage in raisin, table, and wine grapes.

Each planting was surveyed as near to harvest as possible--usually 1 to 4 days before. In each planting, one plot consisting of 30 consecutive vines was randomly chosen from planting dimensions. On each vine, one bunch of grapes each was randomly chosen from near the top, the center, and the bottom, and bird damage to each bunch was visually estimated according to seven percentage classes: 0, 1-5, 6-20, 21-50, 51-80, 81-95, and 96-100. These procedures were based largely on results of surveys of bird damage to corn (De Grazio et al. 1969; Stone et al. 1973) and grapes (Stevenson and Virgo, 1971) and the need for a rapid, inexpensive method. Other data obtained at plantings included the number and species of birds seen during the survey and the predominant type of damage (pecked or missing grapes) on each bunch.

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