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BIRD DAMAGE PROBLEMS IN LATIN AMERICA*

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ABSTRACT: In 1968 and 1969, biologists of the Denver Wildlife Research Center made field surveys in six Latin American countries to obtain information on bird damage problems in agriculture under an agreement with the Agency for International Development. Species of icterids, fringillids, psittids, columbids, and anatids caused most of the damage. Grain sorghum, corn, and rice were damaged most heavily. Other crops such as soybeans, wheat, cacao, and mangoes were also damaged, but seldom seriously.

Resident postbreeding populations of birds in Latin America cause some damage to crops in summer, the tropical wet season; however, migrants from the United States and Canada greatly swell these problem populations in winter, the tropical dry season, when smaller acreages of mostly irrigated crops are available. Problems also intensify in October when the largest numbers of migrants descend upon ripening crops and, again, in April when many crops are being planted.

Bird damage problems in Latin America are similar to those in the United States, involving many of the same types of crops and genera of birds. Therefore, research conducted in one area should be beneficial for the other, and cooperative work is recommended.

The initial survey was begun in June 1968, and Center biologists have made four trips to Latin America as of January 1970.

During these surveys, we visited crop-growing areas in the states of Aragua, Carabobo, Cojedes, and Portuguesa, Venezuela; in the vicinity of León, Nicaragua; in the Sula and Chamelecon Valleys of Honduras; in the states of Guanajuato, Jalisco, Michoacán, and Querétaro in Mexico; and in the Nicoyan Peninsula of Costa Rica. We also interviewed about 60 scientists and scientist-administrators to gain information on the location and magnitude of the problems, the crops and bird species involved, the time (seasons and crop growth stages) of greatest damage, the methods used to reduce damage, and the effectiveness of these methods.

Because of the press of research studies in the United States, we have visited crop-growing areas in Latin America only in June, January, and February. June is about the middle of the wet season and is probably the peak of the breeding season for resident birds in the countries visited. It is also one of the few months when migrant birds from the United States and Canada are absent from Central America. February is about the middle of the dry period. Most dryland crops are harvested at this time, but few are planted, except in irrigated areas. Under these conditions, damage increases in irrigated croplands because of the buildup in postbreeding populations of resident species combined with the influx of North American migrants.

FINDINGS

Grain sorghum, corn, and rice were the crops most frequently damaged. Other crops attacked were soybeans, fruits, wheat, and cacao. Various species of the icterid, fringillid, psittid, columbid, and anatid families caused most of the damage. The crops mentioned above, the birds observed feeding in them and the possible control methods applicable to them are reviewed separately. Since much of our information is on sorghum, it is discussed in more detail than corn and rice.

Grain Sorghum

Damaging Bird Species

Grain sorghum appears to be a favorite food of bird populations wintering in Latin America. In Venezuela, large numbers of dickcissels (*Spiza americana*) consumed nearly an entire

*Under a Participating Agency Service Agreement signed in 1967, the Bureau of Sport Fisheries and Wildlife's Denver Wildlife Research Center was enlisted by the Agency for International Development, U.S. Department of State, to investigate bird damage problems in Latin America.

grain sorghum planting near Acarigua. We observed flightlines of about 75,000 dickcissels on the evening of January 25, 1969, at a time when local informants reported that the dickcissel population had "cleaned up most of the crops and migrated south." Those collected had fed on grain sorghum.

In February, smaller-sized fringillids were in almost every sorghum field we visited in both Colombia and Venezuela. Few were in sorghum fields in Costa Rica, Honduras, and Mexico in areas where many breeding pairs had been noted the preceding June, indicating a major migration to more southerly latitudes. The ruddy-breasted seedeater (Sporophila minuta) was the commonest species, occurring in groups of a few individuals to several dozen. They were usually accompanied by blue-black grassquits (Volatinia jacarina) and less frequently by yellow grass finches (Sicalis luteola) and wedge-tailed grass finches (Emberizoides herbicola), all of which are collectively termed "chisquas" by farmers. Female ruddy-breasted seedeaters taken in nets and traps in Colombia weighed as little as 6 grams. It is difficult to visualize that such small birds could cause major damage, but damage by "chisquas" was readily apparent when we inspected the borders of several fields of grain sorghum varieties with low tannin content. At several experimental station plots, "chisquas" combined with parrotlets and parakeets apparently made sorghum yield more a function of a variety's resistance than its yield capacity. Volatinias were noted breeding in grain sorghum fields in Nicaragua in June. Lark sparrows (Chondestes grammacus), sometimes in the hundreds, were observed feeding in harvested sorghum fields in Mexico.

Predicting damage by fringillids is complicated by the probability that their diet before cultivated cereals were introduced must have been native grass seeds. The supply of these (perhaps preferred) foods probably varies considerably with climatic conditions on the savannahs adjacent to the cultivated areas; when wild grass seeds are scarce, more damage probably occurs. Another difficulty in estimating the amount of damage by small birds is related to their size. For example, damage by parrots and doves may be overemphasized, while damage by small flocks of small birds goes relatively unnoticed. Similarly, damage by large flocks of small birds may be noted much more readily than greater damage by a large number of insects or by disease.

Psittids also appear to favor grain sorghum fields. Parrotlets of the genus Forpus were flushed from many sorghum fields in Colombia; parakeets of the genus Aratinga were seen in several Venezuelan fields; and about 200 red-ored parrots (Amazona autumnalis) were observed being herded by rifle fire from the only sorghum field noted near Puntarenas, Costa Rica. Attacks by species of psittids and other bird species may prevent expanded culture of grain sorghum, particularly those varieties with low tannin levels, which appear to be the most palatable both to cattle and to birds.

Parakeets are a perennial problem in the vicinity of León, Nicaragua. In June 1969, we conducted tests with amplified parakeet calls and chemical frightening agents in two sorghum fields being damaged by orange-fronted parakeets (Aratinga canicularis). The birds were never observed feeding on the ground; instead they perched on the stalks, cracked the seed, and extracted the doughy center. Individual birds caused substantial damage, eating 30% to 40% of their weight (75-80 g) daily. We netted birds very easily; in 2 hours, 23 of a flock of 200 were caught in two mist nets. They were strongly attracted by some broadcast distress calls, slightly repelled by others. A call obtained by dosing a bird with 4-aminopyridine, a chemical fright-producing agent, resulted in the most "mobbing." A distress call obtained by pestering a netted bird appeared to frighten birds more than the distress call obtained from the bird affected with 4-aminopyridine.

Doves, primarily resident species, are a very widespread, though usually minor, problem in Latin America. However, damage by the white-winged dove (Zenaida asiatica) and eared dove (Zenaida auriculata) is locally serious. These doves, unlike the mourning dove (Zenaidura macroura) of North America, alight and feed on heads of standing grain. We saw about 500 whitewings feeding in a grain sorghum field near León, Nicaragua. Doves were also reported to cause damage in the Sinú Valley of Colombia, both at planting time in May and September and after the grain matured in August and September. Cottam and Trefethen (1968) reported that whitewings also damaged grain sorghum fields in Mexico.

Blackbirds were reported to be a major problem in October and November in grain sorghum fields in the highland plateau states of Mexico. When we visited this area in late February, all of the sorghum crops had been harvested, but we frequently saw flocks of 10,000 to 100,000 blackbirds gleaning fields wherever large rivers or lakes provided suitable roosting habitats. Yellow-headed blackbirds (Xanthocephalus xanthocephalus) concentrated most heavily in the Lake Yuriria area of Guanajuato, along the Rio Lerma in Michoacán, and near Lake

Chapala in Jalisco. Brief discussions with farmers indicated that the yellow-head is troublesome in October and November and at planting time in March. Brown-headed cowbirds (Molothrus ater) were especially numerous, and flocks of 5,000 to 50,000 were commonly noted gleaning grain sorghum fields in the states of Guanajuato, Michoacan, and Querétaro. Boat-tailed grackles (Cassidix mexicanus) in flocks numbering up to a thousand or more were encountered in sorghum fields near almost every city and town we visited in Mexico.

Control Methods

Chemical frightening agents would seem to be an excellent answer for many of the bird problems in grain sorghum, because these agents are far more effective in clearing fields where thousands of birds are feeding than where there are only small groups (Woronecki, et al., 1967).

Generally, methods for reducing crop damage by fringillids have been ineffective. Members of this family are not very responsive to mechanical frightening methods and patrolling, although both have been regularly tried. Perhaps chemical frightening agents, which rely on behavioral responses of unaffected birds, would be more effective, and even decoy trapping of species that are highly gregarious (as most of them are) may have value.

In the areas we visited, the present methods of protecting sorghum from psittid damage are patrolling and the use of gas-powered cannons. Patrolling is apparently quite effective for small fields of several hectares; and where a very inexpensive labor supply is available, this is perhaps the most effective method at this time. However, patrolling is both less effective and more costly for large fields, and improved methods of reducing damage are needed. The gregarious nature of members of this family and their highly developed communication system should make them responsive to chemical frightening agents, amplified distress or alarm calls, and even, perhaps, to decoy trapping. These measures may possibly afford substantial protection at low cost.

Generally, sport hunting and utilization of the birds for food is the preferred method of alleviating damage by white-winged and eared doves. However, in areas where the eared doves are especially abundant, an occasional grower has resorted to poisoning. In one case reported, the grower was fined for this practice, but he believed the fine was far less than the benefits received from the reduction of dove damage to his crop.

Chemical repellents, patrolling, and gas-powered cannons have been tried for reducing damage by blackbirds. Chemical bird repellents have been reported to be somewhat effective in Mexico against damage to germinating grains (Young and Zevallos, 1960), but none of the recently discovered and more effective bird repellents such as DRC-736 (West et al., 1969) have been tried. In Honduras the patrolling of newly seeded fields by small boys was reported to be fairly effective, and perhaps it would be difficult to improve on this method when an abundant labor supply is available.

An approach to the bird problem in sorghum with far-reaching implications is the planting of high-tannin, bird-resistant varieties. In Venezuela, we had an opportunity to view a planting of a resistant sorghum, AKS-614, that had escaped damage by dickcissels and that yielded nearly as well as the commonly planted African variety, Swasi. A nearby planting of Swasi had been nearly destroyed by dickcissels. Colombian agronomists also reported that one of their new high-yielding varieties, P-25, appears to be less susceptible to bird damage. Honduran agronomists were less enthusiastic about this approach, stating that their bird resistant variety, DKBR-47, was useful when other foods were available but was taken when other foods were scarce.

Corn

The discovery of the benefits of high-lysine corn, Opaque 2, in the cure and prevention of severe cases of human malnutrition (D. D. Harpstad, personal communication) increases the importance of bird problems in this crop. It is anticipated that new crop areas will be cleared from present jungle and brush habitats, and that these will be subject to increased bird pressure. Many of the intensively cultivated valleys have been largely cleared of the wolf trees that are necessary for parrot breeding; now only corn areas adjacent to foothills are extensively damaged. With the increased acreage in habitats more favorable to birds that cause damage, corn protection methods now being successfully developed in the United States (De Grazio, 1964; Woronecki et al., 1967) would also appear to have special value in Latin America.

In February, most cornfields had been harvested in the areas visited, or were in early, nonvulnerable, growth stages. However, the few cornfields in the milk, dough, and dent stages, certainly attracted species of parrots and blackbirds. One farm near Progreso, Honduras, near the Uluá River, had small numbers of "chekos" (an unidentified woodpecker), red-winged blackbirds (Agelaius phoeniceus), and white-crowned parrots (Pionus senilis) all feeding on corn in the same field at one time. The redwings were stripping the husks and feeding on the ears in the milk and dough stages, and the parrots were cutting into the more mature ears. This type of damage by parrots, parakeets, and parrotlets was reported to be more serious in the Choluteca and Comayagua areas of Honduras than in the Sula Valley and probably occurs in many corn-growing areas in Latin America.

The lack of adequate storage and drying facilities in these humid areas prolongs the damage period. An ear of corn that has been damaged by psittids absorbs moisture which increases spoilage; also, the damaged ears become more vulnerable to subsequent attack by smaller birds that are usually unable to open the ears themselves.

Damage by boat-tailed grackles to emerging corn seedlings was commonly reported in Honduras and Mexico. Skutch (1954) reported that boat-tails greedily tear up sprouting corn in newly planted fields and gave an example of one Guatemalan farmer's frustrated efforts in starting a cornfield. Young and Zavallos (1960) also reported that brown-headed cowbirds and boat-tails cause serious damage to sprouting corn in winter in tropical Mexico. Chemical repellents were an acceptable answer to a similar problem in Texas (West and Dunks, 1969).

Chemical frightening agents also appear to be an excellent answer for many of the bird problems in corn. Mechanical frightening methods, patrols and trapping may also be effective.

Rice

The dickcissel was frequently implicated in rice damage in Costa Rica, Venezuela and Colombia. In Costa Rica, Slud (1964) described it as "the supreme pest of the rice fields," and also stated that "it arrives like a plague from foreign parts as the rice ripens." Depredations in Costa Rica take place from September to November. In Trinidad, French (1967) reported that the chief food of dickcissels is rice left in the fields; and in Venezuela, Röhl (1959) stated that they cause "enormous ruin" in rice fields and that growers consider them a virtual plague.

Bobolinks (Dolichonyx oryzivorus) were regularly mentioned as a species of increasing economic importance in rice culture, particularly during their return migration to the United States and Canada in April and May. The consensus among Venezuelan scientists was that bobolinks are increasing, and this was borne out by a documented report from a rice-growing area near Carro Seco in the State of Portuguesa, where bobolinks destroyed 30% of an 80-hectare planting in mid-May 1968.

Although rice has a reputation for being severely damaged by birds, we generally saw fewer birds in ripening rice fields than in grain sorghum fields nearby. In the Tolima sector of the Magdalena Valley, one of the chief rice-growing areas in Colombia, where rice fields were being harvested and planted, we did not see any substantial flights of birds during the evening hours when birds are usually the most active, taking their final meal and going to roost.

Small numbers of fringillids, particularly the blue-black grassquit, were present in many rice fields in Colombia. In this country, doves were present on most newly seeded fields, particularly the ruddy ground dove (Columbigallina talpacoti), but also eared doves and doves of the genus Leptotila. One such field near Ginebra in the Cauca Valley of Colombia contained about 500 doves, mostly ground doves. Information on the extent and seriousness of dove feeding in standing rice was vague, but small flocks of eared doves were quite common in the Calabozo rice-growing district on the llanos of Venezuela.

Experiment stations growing rice out of phase with commercial production appeared to be especially vulnerable and to receive an inordinate amount of damage. On one such experiment station near Palmira in the Cauca Valley, we trapped and netted shiny cowbirds (Molothrus bonariensis), ruddy ground doves, ruddy-breasted seedeaters, yellow grass finches, blue-black grassquits, and red-breasted blackbirds (Leistes militaris). Although fringillids were the most numerous, the most damage was caused by shiny cowbirds.

Tree ducks (Pendrocygna spp.) cause locally serious problems in rice fields in Venezuela and Surinam. The white-faced tree duck (D. vidua) which formerly bred in the small ponds

in the llanos, has adapted to breeding and feeding extensively in irrigated rice fields; and complaints by rice growers are increasing. Venezuelan biologists are just beginning to gather pertinent ecological data on this species. The problem has become so severe that rice growers in the Calabozo district of Venezuela requested and obtained a special-permit hunting season on the ducks from May 17 to July 31. Venezuelan biologists have evidence indicating this period covers the peak of the ducks' breeding season.

Many blue-winged teal (Anas discors) winter in the Lake Maracaibo region of Venezuela and are reported to cause some problems in rice. However, they have been reported to be less wary than the resident species of ducks, and the number of band returns from teal banded in the United States and Canada would tend to confirm this. Problems with migrant ducks in rice were also reported in Mexico.

Sport hunting is the method usually recommended to reduce waterfowl damage. Gas-powered cannons (exploders) are finding increasing favor among rice growers; one Venezuelan rice grower we interviewed stated that one of these cannons adequately protected 40 hectares (90 acres) of newly planted rice--truly amazing coverage, but perhaps understandable where hunting pressure is intense and prolonged, serving to reinforce the cannon noise.

Newly discovered chemical repellents will probably be used heavily in the protection of seeded rice. Patrolling is the only practical means at present to reduce bird damage on ripening rice.

Other Crops

Bird damage to other crops was reported to be more localized. We obtained scattered reports of substantial damage by Andean sparrows (Zonotrichia capensis) to emerging wheat seedlings in the state of Cundinamarca, Colombia. In Honduras, some planting of wheat is done before the rains, and because the ground is quite hard at this time, white-winged doves eat many seeds which are not adequately covered.

In the upper Cauca Valley, Colombia, eared doves cause substantial damage to germinating soybeans by grazing the cotyledons as they emerge from the soil.

Parrots and orioles were reported to have damaged mangoes in Honduras, and parrots were also reported to have damaged mangoes in Sinaloa, Mexico. Brown jays (Psittorhynchus mexicanus) were reported to have damaged fruits in Costa Rica. Scattered reports of woodpeckers damaging cacao pods on the Caribbean coast in Costa Rica and in the state of Chiapas, Mexico, were also obtained. Orpendolas were reported to have damaged fruits on the north coast of Venezuela.

DISCUSSION

Although we were not familiar with the habitats of birds of Latin America before our visit, we found that the damage to types of crops and to plant growth stages was quite similar to that encountered in habitats of birds in the United States. Even the resident species of birds that cause problems, with the exception of psittids, usually belonged to genera of birds that reside in or visit the United States, and sometimes exhibited some of the same destructive habits. Because there are more similarities than dissimilarities in the bird problems of Latin America and the United States, we believe that bird damage research conducted in one area would have significant value for farmers in the other, and that cooperative studies by Latin American and United States scientists on some of the problems should be mutually rewarding to taxpayers of both areas. The following is an illustration of the type of benefits that might be expected:

In temperate regions of the United States, planting of grains is largely restricted to the months of April and May, and ripening grains are vulnerable to birds mostly in the months of August and September. These seasons give researchers only short periods each year to field test damage control procedures. In Latin America, many of the same crops ripen almost every month of the year. Whereas research in the United States now takes 3 years and usually longer to work out an effective procedure to control a specific type of damage, the availability of similar problems in Latin America should substantially shorten the time needed for a solution. For example, if someone found an effective method to prevent psittids from husking corn in Latin America, it might need only slight modifications to prevent blackbirds from husking corn in the United States. If someone found an effective method for dealing with dickcissel damage in rice in Latin America, it would have value as a basis for dealing with blackbird depredations in rice in the United States.

We are now beginning this kind of cooperative work on selected Latin American bird problems and will enlarge the scope of research as enough information becomes available to intelligently establish priorities.

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