

AGENCY FOR INTERNATIONAL DEVELOPMENT WASHINGTON, D. C. 20523 BIBLIOGRAPHIC INPUT SHEET	FOR AID USE ONLY BATCH #20
---	--------------------------------------

1. SUBJECT CLASSIFICATION	A. PRIMARY Serials	Y-AH10-0000-G302
	B. SECONDARY Agriculture--Pests of plants--Latin America	

2. TITLE AND SUBTITLE
 Vertebrate damage control research in agriculture; Cali, Colombia Field Station
 1974 annual progress report

3. AUTHOR(S)
 (101) Denver Wildlife Research Ctr.

4. DOCUMENT DATE 1975	5. NUMBER OF PAGES 26p.	6. ARC NUMBER ARC
--------------------------	----------------------------	----------------------

7. REFERENCE ORGANIZATION NAME AND ADDRESS
 Interior

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publisher, Availability)
 (Research summary)

9. ABSTRACT

10. CONTROL NUMBER PN-RAB-171	11. PRICE OF DOCUMENT
12. DESCRIPTORS Colombia Nicaragua Pest control	13. PROJECT NUMBER
	14. CONTRACT NUMBER PASA RA(ID)1-67 Res.
	15. TYPE OF DOCUMENT

VERTEBRATE DAMAGE CONTROL RESEARCH IN AGRICULTURE

INVESTIGACIONES SOBRE EL CONTROL DE DAÑOS CAUSADOS POR LOS VERTEBRADOS EN LA AGRICULTURA

1974 ANNUAL REPORT
INFORME ANUAL 1974



PALMIRA, COLOMBIA
RESEARCH CENTER
CENTRO DE INVESTIGACIONES

Cooperating Agencies
Agencias Cooperadoras



U.S. AGENCY FOR
INTERNATIONAL DEVELOPMENT
Bureau of Technical Assistance
Office of Agriculture and Fisheries
Washington, D.C.

U.S. DEPARTMENT OF
THE INTERIOR
Fish and Wildlife Service
Division of Population Regulation Research
Denver Wildlife Research Center

**CALI, COLOMBIA, FIELD STATION
1974 ANNUAL PROGRESS REPORT***

PRINCIPAL INVESTIGATORS:

**Paul P. Woronecki, Danilo Valencia G., Donald J. Elias,
J. Fernando Londono V., Rene Bojorge, Julio Sequeira F.**,
James M. Ramakka and Vicky F. Ramakka*****

COOPERATING AGENCIES

Colombia -

Instituto Colombiano Agropecuario (ICA)

Nicaragua -

Banco Nacional de Nicaragua

United States

**Agency for International Development (AID)
U.S. Fish and Wildlife Service
Denver Wildlife Research Center (DWRC)**

***Results Incomplete and Not for Publication, Release, or Use
Without Authority of the Director, Denver Wildlife Research
Center.**

****Dr. Sequeira and Mr. Bojorge are with the Banco Nacional de
Nicaragua.**

*****Peace Corps Volunteers attached to the Instituto Colombiano
Agropecuário, Palmira.**

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	ii
OBJECTIVES	1
RESEARCH ACTIVITIES - COLOMBIA	
Investigations of the Extent and Economic Importance of Vertebrate Damage to Agricultural Crops in Colombia	1
Eared Dove Damage in the Cauca Valley	2
Assessment of Eared Dove Damage	6
Eared Dove Food Habits, Biology, and Economic Importance	7
Control of Rodent Damage in Coconuts	9
Investigation of the Extent and Economic Importance of Other Rodent Problems in Colombia	9
Vampire Bat Control in Colombia	10
RESEARCH ACTIVITIES - NICARAGUA	14
Birds	14
Rodents	17
LITERATURE CITED	19
PERSONNEL AND VISITORS	20
FUTURE STATUS OF STATION	22

ABSTRACT*

In the Cauca Valley, little damage caused by eared doves (Zenaida auriculata) was reported or observed. In simulation tests of doves damaging soybeans, significant losses do occur during the early plant development stage. Dove damage can be reduced by effective use of a repellent chemical (Mesuro1), good cultural methods, and bird scarers. Additional data was compiled on the food habits, biology, and damage caused by eared doves. Other serious bird damage problems are caused by dickcissels (Spiza americana) and shiny cowbirds (Molothrus bonariensis).

Plans were formulated to assist the Government of Colombia in a rat control campaign on San Andres Island. The cane rat (Zygodontomys brevicauda) was implicated in causing severe losses to rice.

Vampire bat (Desmodus rotundus) campaigns and training sessions were conducted in the Departments of Guajira, Nariño and Valle.

In Nicaragua, additional information was gathered on bird and rodent damage to rice in cooperation with Banco Nacional personnel.

*This research was conducted with funds provided to the U.S. Fish and Wildlife Service by the Agency for International Development under the project "Control of Vertebrate Pests: Rats, Bats and Noxious Birds," PASA RA(ID) 1-67.

OBJECTIVES

The objectives of the program are to conduct research aimed at developing safe, effective, and economical methods of reducing crop losses caused by birds and mammals, and to develop Latin American capabilities in the field.

COLOMBIA

Investigations of the Extent and Economic Importance of Vertebrate Damage to Agricultural Crops in Colombia

Introduction

A summary of vertebrate damage in Colombia agriculture was presented in the 1970-1973 Annual Reports. Whenever possible, station personnel investigated reports of damage to delineate the problems and to determine where research should be directed. Additional reports of vertebrate damage are in DWRC and ICA files.

Procedures

Inquiries were made of most reported problems and follow-up information was requested. The information received determined if an investigation was justified.

Results and Discussion

The following items appear to be the most serious problems in Colombia, and research has been concentrated in these areas.

Several mammalian species are reported to cause agriculture problems. Rats (Rattus rattus) damaging coconuts is considered the most serious economic problem, especially on the island of San Andres. Although a control method has been found, further research is needed to refine the techniques.

The cane rat (Zygodontomys brevicauda) has caused severe agricultural damage in the Departments of Choco, Cesar and Meta, and the cotton rat (Sigmodon hispidus) and the neotropical water rat (Nectomys alfarri) have been implicated in rice damage in the Department of Cordoba. These species range throughout Northern South America and Central America (Walker, 1964). Zygodontomys and Sigmodon are species that are prone to population explosions (Herskovitz, 1962) and should receive serious attention in the future.

Until 1971, the eared dove (Zenaida auriculata) was considered the most serious bird pest in Colombia, especially in the Cauca Valley. It is still considered the most serious bird pest in Uruguay and Argentina and an important bird pest in other Latin American countries.

Some possible explanations for not being considered a serious bird pest in Colombia at this time are:

1. Crops may be less vulnerable due to altered agricultural practices.
2. Soybeans are no longer needed as a food supplement during critical seasons.
3. Waste grain and weed seeds are abundant.
4. The eared dove may be at a population low due to natural fluctuation or adjustment to changing environmental conditions.
5. Reduction in nesting sites.
6. A wider distribution of the total population reducing seasonal concentrations in areas where crops are vulnerable.

The dickcissel is another serious agricultural pest in many countries of Central and South America. The bird is migratory and causes seasonal, sporadic, irregular and often serious damage to grain crops.

The shiny cowbird causes isolated but severe damage in Colombia and is a potential serious agricultural pest. Members of the parrot family (Psittacidae) have been considered a serious agricultural pest in many areas of the tropics. Although we have found only local situations in Colombia where this type of problem would be considered serious, efforts to study this problem in other countries should be made.

Eared Dove Damage in the Cauca Valley

Introduction

The eared dove has been reported to cause serious agricultural damage in many Latin American countries, and in 1969 and 1970 it was considered the most serious pest in the Cauca Valley of Colombia. The seriousness of this agricultural problem has declined in the past 4 years. Data has been accumulated on food habits, breeding seasons, other aspects of eared dove ecology, and the effectiveness of Methiocarb (DRC-736) as a soybean seed repellent (see Annual Reports 1971-1973). Effectiveness of Methiocarb as a soybean seed repellent was field tested and observations indicated good repellency, but a qualitative and quantitative evaluation is still needed.

Procedures

Data was accumulated by field observations, reports, and collections throughout the Department of Valle.

Results and Discussion

In January, an attempt to band eared-dove nestlings near Roldanillo was unsuccessful because of poor nesting success and the location of the nesting site. The terrain and vegetation made it impossible to locate many of the nests, and many eggs were found broken below the nests.

During early March, flocks of up to 50 doves were observed daily loafing in an unharvested cornfield near the ICA Farm.

In April, 500 eared doves concentrated daily in a disced weed field on the ICA Farm, and attempts to trap these birds were unsuccessful. Observations revealed that the birds were only loafing in the field and not feeding. Feeding apparently took place in the harvested ricefields at CIAT. Only 52% of 42 birds collected from this concentration were adults and the rest were both subadults and immatures. The adult doves seemed to be in a nonbreeding part of the reproductive cycle and they were in a heavy molt. Other smaller groups of eared doves (2-10) were seen feeding in harvested cornfields on the ICA Farm.

In April and May, up to 2000 doves continued to be observed loafing and feeding in fields on the ICA Farm, and the concentration of doves seen between Cali and Palmira were feeding in harvested ricefields. Very few doves were observed flying into the Valle from the Rio Amaime Canyon (a major flyway located in November 1973 in the mountains east of Palmira) indicating that the canyon receives only seasonal use or that the canyon may have another entrance. Observations of dove daily activities were definitely different during the low in the breeding cycle when compared with activity during the high in the breeding cycle.

In May, large concentrations of eared doves (500-1000) were observed at dusk flying north of Palmira. Some birds were entering a large estate (Manuelita), and part of this group roosted in trees around the residential area. Only small concentrations were observed on the ICA Farm, but larger concentrations (10-1000) of doves were seen flying between Cali and Palmira feeding in harvested sorghum and ricefields. Near the Cartago area we discovered large numbers of doves (flocks of 100) scattered throughout the pasture along the Cauca River along with breeding pairs (several nests were located).

In June, very few doves were observed on the ICA Farm or in the Cali-Palmira area. Near Cartago there were very few doves scattered throughout the pasture, but nests with eggs were located.

In July, very few doves were observed on the ICA Farm, in the area between Cali and Palmira or along the Cauca River near Cartago.

In August, large concentrations of doves were observed on the ICA Farm and at CIAT feeding in harvested rice and cornfields. Large flocks were also observed near Tulua. Very few pairs were observed near Cartago.

In September, October, November, and December very few doves were observed in the Valle.

In June, doves were reported damaging newly planted rice near the Cali airport but an investigation revealed that the doves were feeding on the seeds left on the surface after planting and were easily discouraged from feeding in the fields by the flooding of the fields.

This year little damage to agricultural crops by eared doves was reported or observed and only one report of dove damage to emerging soybeans was received and only light and isolated damage from doves was reported by sorghum growers. Large concentrations of doves were only observed in harvested corn, rice, and sorghum fields.

Possible explanations for no serious dove damage problems in the Cauca Valley during recent years are:

1. Crops may be less vulnerable due to altered agricultural practices.
2. Soybean cotyledons are no longer needed as food supplement during critical seasons.
3. Waste grain and weed seeds are more abundant.
4. The eared dove may have adjusted to the new environment created by increasing agriculture in the Valle.
5. Reduction of nesting sites.
6. A wider distribution of the total population reducing seasonal concentrations in areas where crops are vulnerable.

Distribution of the eared dove in the Cauca Valley seems to be a function of food supply. Freshly harvested fields of rice, corn, and sorghum usually serve as feeding areas for the doves. The birds in the southern part of the valley apparently nest and roost in the mountains which border the valley and use river canyons as flyways between the roosting and feeding areas. Such flyways were found in the canyons of the Rio El Palo (in the Department of Cauca), Rio Amaime and Rio Tulua. At least one other major flyway has been reported near Yumbo and others are likely to exist.

The factors which influence the doves' feeding areas are not yet known. A harvested field which contains a large number of feeding doves one day may be almost empty of birds the next, even though food is still present. When such situations occurred during this study, it was usually found that the birds had changed feeding areas to a more recently harvested field closer to their flyway. However, at other times, doves flying out of the mountains were observed to pass directly over freshly harvested fields to feed in more distant areas. The flocks would often drop to a very low altitude as they flew over the fields and then continue on their way. Apparently some unknown factor made these fields less attractive as feeding areas than those more distant.

In the Roldanillo-La Seca area, the doves do not seem to fly as far to nest and roost. They use the dry foothills of this region for nesting areas. This is apparently a traditional nesting area which was used even before the dove population expanded to other parts of the valley. According to Dr. Jorge Hernandez (personal communication), this area was known as a good dove hunting location for many years. He also observed that the range of xeric vegetation, particularly cactus, in the valley has been extended by grazing and clearing of land for pasture. It is possible that the increase in range of the spiny vegetation in which the doves seem to prefer to nest may, in part, explain why the population of the eared doves increased in size so much in past years. An increase in acreage devoted to crops such as soybeans, sorghum, and corn may also have contributed to the increase by creating the "mosaic pattern landscape" (Bucher 1970) which could support large numbers of doves.

Despite an article in one popular magazine which stated, "The Colombian Department of Agriculture estimated that there were at least 20 million doves in the 120-mile-long Cauca Valle (Colombia)", as far as we know there has been no attempt to censusing the dove population in the Valley. In order to arrive at a population estimate, such a census would have to be conducted by observers spread throughout the valley to count birds on the same day during the same hours. Otherwise, due to the daily activity patterns of the doves and the frequency with which they change feeding areas, the possibility of duplicated counts is likely.

Assessment of Eared Dove Damage

Introduction

Evaluation of any vertebrate damage to crops is necessary to determine economic losses, to evaluate results of control experiments, and to determine cost-value relationships of control programs.

Eared doves eat soybeans left above the ground at planting time and during seed germination and emergence. Doves will eat the cotyledons of plants. The effect this feeding has on crop production is not known.

Procedures

In 1973, studies showed no apparent effect on plant density from simulated damage. This damage was simulated when cotyledons were opening and may be the reason that the plant density was not affected. During this year's study we hoped to determine how earlier simulated damage would affect growth and yields and to see if a dove damage appraisal technique could be developed for this type of damage.

The study consisted of the removal of one or two cotyledons during the first 3 days of plant emergence.

Results and Discussion

Results obtained from the test were:

1. The average weight of the beans, the height of the plants, and the number of beans per pods were not affected by any of the simulated damage.
2. The number of pods per plant was significantly less when both cotyledons were removed or if one was removed the day of emergence.
3. The removal of plants and cotyledons early will affect the plant density.
4. The yield per area was less when both cotyledons were removed during the first 2 days of emergence.

The data shows that damage to both cotyledons or removal of both cotyledons during the first 2 days of plant emergence can significantly affect production; damage control techniques should be applied before this period and during the first 2 days of plant emergence.

Eared Dove Food Habits, Biology, and Economic Importance

Food Habits. Food habits of the eared dove in the Cauca Valley has been reported on in detail in previous Annual Reports. Peace Corps volunteers James and Vicky Ramakka collected most of the data with assistance from project personnel. A manuscript is being prepared. Raw data is being held in DWRC and ICA files.

Biology. More data was collected on age and sex composition, reproduction, morphology, and diseases and parasites, in addition to that reported in previous Annual Reports and is in DWRC and ICA files.

Economic Importance. Records of dove hunting in the Cauca Valley for the period January 1973 to April 1974 were obtained from Inderena's regional office in Popayan (Table 1). Over 85 dove hunters spent about 200 days afield hunting eared doves. These hunters killed nearly 8000 doves, but many more doves were harvested by local hunters since only commercial outfitters and contests held by hunting clubs are required to file reports. These reports are required only for a relatively small part of the Cauca Valley.

Each foreign hunter pays an approximate minimum of \$100 U.S. daily for guide services and hotel accommodations. In addition, they also pay for meals, shotgun shells, and miscellaneous expenses. Hunting license fees are \$50 Col pesos (\$2.00 U.S.).

Table 1. Information from the Inderena Regional Office in Popayan on dove hunting between January 1973 through April 1974.

Month	Department	Hunters	No. Days	Doves
1973				
Jan/Feb	Cauca	1	4	567
Feb	Valle	12	1	920
March	Cauca	7	2	382
April	Cauca	7	2	597
May	Valle	4	2	400
June	Cauca	10	4	413
July	Cauca	13	3	381
August	Cauca	8	5	1209
1974				
Feb/March	Cauca	1	7	1030
March	Cauca	3	3	317
April	Cauca	6	2	782

Control of Rodent Damage in Coconuts

Introduction

Results of surveys and a trial (1972-1973 Annual Reports) revealed losses in the coconut crop on San Andres Island off the north Colombian coast in excess of 75% (estimated value of over \$1,000,000 U.S.) annually. Rodent damage to coconuts in Colombian plantations ranged from light (4%) to very heavy (77.5%). The results of the trial indicated that diphacinone bait placed in the crowns of palms was highly effective in controlling damage. Losses in excess of 75% were reduced to zero, and no damage was noted during periodic checks for at least 2.5 months following treatment. Subsequently, occasional damage was encountered and treatment effectively controlled it. Results of these investigations were published by ICA in English and in Spanish, and another manuscript was submitted to the PANS Journal, London.

Procedures

Meetings were held and plans made for a large rat control campaign on the Island of San Andres under an AID/Bogota supported ICA/Bogota program.

Results and Discussion

The first phase of the rat control campaign on the Island of San Andres will begin in February 1975 under the supervision of the Division of Plant Sanitation, ICA, Bogota with technical assistance from this project.

Investigation of the Extent and Economic Importance of Other Rodent Problems in Colombia

Introduction

The reports in 1973 of serious rat damage problems in rice and other crops have increased and several were investigated.

Procedures

Whenever possible, trips were made to areas experiencing rodent problems to determine the severity and the involved species.

Results and Discussions

A severe "ratada" (devastation of cultivated fields by rodents) was reported from the Department of Cesar in January and February, and it was investigated in March. The investigation revealed that a

large population of cane-rats (Zygodontomys brevicauda) were causing damage to the rice crops in the southern part of the Department. Rice is a relatively new crop to the area and the problem, likewise, is recent. Attempts to control these rats with commercial rodenticides (at \$1,000.00 Col. per hectare) have been unsuccessful. At the time of the investigation most of the rice had been harvested, and the losses on the 90 hectares were estimated to be about \$1,200,000.00 Col or \$47,000.00 U.S. Ricefields being harrowed were crowded with birds of prey and bird scavengers eating rats. It was reported that similar damage was experienced in corn and sorghum. Nonseasonal planting and harvesting, poor weed control, and second-growth grains may be one of the causes for this problem. This problem was to be kept under surveillance by the growers and local agronomists. Additional reports concerning the status of the problem during the rest of the year were not received.

During August, rats were reported damaging 47 hectares of rice on the ICA Farm (Turipana) near Monetria - Cordoba. It was estimated that 1.5 hectares were already lost. The problem was investigated during the latter part of August. Damage was in patches within the ricefields. The damage in one lot was estimated to be 20% while another lot of 5 hectares was completely lost to rats. Good control on 7 hectares was achieved with an application of zinc phosphide treated rice (2%).

Several reports were received in December from the Department of Meta (Lalnos) of serious rat problems in rice. The problem could not be investigated, but several rats were brought to the station for identification. All specimens were cane rats (Zygodontomys sp.). Reports of damage as high as 50% were received. This problem will be investigated as soon as possible in the meantime, some ZnP was sent to the area for a pilot trial.

Vampire Bat Control in Colombia

In 1973 Colombia held a Vampire Bat Control Workshop in Valledupar which was sponsored by ICA and USAID. Local control programs and training were held in the Department of Guajira, Narino and Valle in 1974.

Reports of vampire bat problems near Cartago, Valle and from the Department of Narino were received and investigated.

Procedures

In order to help develop vampire-bat control programs and campaigns in Colombia, assistance was given to ICA in the form of investigating reports of vampire problems, obtaining equipment, training personnel, and assisting in programs.

Narino. A cattle area near El Tambo and El Penol in the Department of Narino was reported to be plagued by a serious vampire bat problem. According to the ranchers, the problem has been quite serious since 1972, and it is especially obvious during August and September when many ranchers move about 2,000 cattle to higher/cooler pastures. Bovine rabies has not been reported in the area. The first visit to the area was made in July when 73 cattle were examined and all of them had at least one fresh vampire bite. The cattle observed were pastured on poor range and were suffering from diseases and parasites.

Not because of economics, but because of the possibility of rabies, ICA Region 5 decided to conduct a vampire control campaign in this area. The purpose of the campaign was to reduce the vampire bat population in order to prevent any rabies outbreaks.

Because the cattle are scattered throughout the area and the vampire retreats could not be located, chemically treating the cattle with the anticoagulant diphenadione was the only method of control employed during the campaign.

The campaign was publicized by correspondence, personal communication, meetings, discussions, slide presentations, and demonstrations. Full collaboration of all the ranchers in this area was obtained. Assistance and collaboration was also received from ICA/Pasto, the Narino Secretary of Agriculture, and INCORA/Pasto.

Valle. The El Mirador Ranch near Cartago in the Department of Valle reported vampire bats biting cattle. The problem was investigated in May. Cattle (168) were observed, and 19 had fresh vampire bites (12%). One calf had four fresh bites, and one horse had seven fresh and 10 old bites. The vampires causing the problem were located in an opening above a railroad tunnel on the ranch. Three vampire bats and three leaf nose bats were caught in mist nets and several vampires were observed in the man-made cave. This site was used for training personnel in controlling vampire bats by topically treating them with diphenadione.

Tolima. A report of a possible vampire-rabies outbreak was received from Chaparral in the Department of Tolima, but it could not be investigated. ICA/Bogota suspected cats and dogs as the vectors in the bovine rabies cases.

Results and Discussion

Narino. The most severe vampire problems are located in four zones near El Tambo and El Penol. The campaign was concentrated in two zones.

Three teams were responsible for treating cattle and counting fresh vampire bites. These teams consisted of at least one professional and two field assistants aided by the rancher and field hands.

Table 2 shows that a total of 481 cattle were treated in the Narino area. Owners paid \$1.00 Col (\$0.04 U.S.) for each injection.

Table 2. Treatment of cattle for controlling vampire bats, El Tambo and El Penol (Narino), October 1974.

Ranchers (No.)	Cattle Examined (No.)	Young Cattle <4 Mo. (No.)	Fresh Bites (No.)	Animals Treated (No.)
22	542	61	290	481
Bites/Animal = .53				

Seventeen of the 61 animals treated were re-examined, and only one fresh bite was observed (a reduction of 94 percent).

The limited data collected indicates that treating cattle with "vampiricide" is an effective means of reducing, if not eliminating, vampire problems in areas such as El Tambo and El Penol if sincere cooperation and collaboration can be obtained from all owners of cattle in the area experiencing vampire problems.

Valle. Cattle were checked and vampires were treated at Cartago, Valle from June until December. Results are summarized in Table 3.

Table 3. Results from Finca El Mirador, Cartago - Valle, Colombia where vampire bats were treated with diphenadione (topical method) 1974.

Date	No. of Cattle Checked for Fresh Bites	No. of Cattle With Fresh Bites	Cattle with Fresh Bites (%)	No. of Vampires Captured	No. of Vampires Treated	Reduction of Bites (%)
June 19	161	24	15	10	10	---
20	80	12	15	--	--	---
July 18	---	--	--	8	8	---
19	183	12	7	--	--	47
August 22	190	3	2	--	--	---
22*	106	0	0	--	--	93
November 13	---	--	--	6	6	---
14	100	1	1	--	--	---
14	90	0	0	--	--	97
December 12	150	0	0	--	--	100

*Stanchioned

NICARAGUA

BIRD AND RODENT DAMAGE PROBLEMS IN NICARAGUA

Introduction

Biologist Don Elias made a trip to Nicaragua in March at the request of Banco Nacional de Nicaragua through the AID Mission in Managua.

The purpose of the trip was to investigate occurrences of damage to rice and sorghum crops caused by the dickcissel (*Spiza americana*) and to conduct field trials with experimental chemicals to determine their efficacy in reducing damage. A secondary objective was to seek further information regarding the rodent damage situation in the rice growing areas.

Dr. Julio Sequeira and Rene Bojorge of the Technical Assistance Department of the Banco Nacional de Nicaragua again provided excellent cooperation and assistance.

Birds

Dickcissels. Dickcissels breed on the Great Plains of the United States. They arrive on the breeding grounds in March and April and begin their southward migration in September and October. The majority of the population winters from Colombia eastward to Guiana. During the fall migration, dickcissels funnel through Central America and cause damage to cultivated crops such as grain sorghum and rice. They are also a problem in many countries of South America. Dickcissels also cause damage during their northward migration.

In Nicaragua, during the south migration, dickcissels first arrive during late August. The peak population is reached about the first 2 weeks in September and most birds are gone by early October. Some years, they may stay on until November or December. During the north migration, first birds are reported in late February, peak in mid-March and decline by mid-April.

During the fall migration, dickcissels cause greatest damage to maturing rice, maturing sorghum, and some newly planted rice. In the spring, the same crops are damaged, but in the newly planted stage. Some farmers have altered their planting and harvesting dates, when they are able to, to plant or harvest before birds arrive. Birds occur only on the Pacific side of Nicaragua, where cultivated crops are grown. The Caribbean side is thinly inhabited and supports little agriculture.

AID/DWRC, Banco Nacional, and USAID personnel have gathered much useful data on the dickcissel problem. Data has been obtained on when and

where damage occurs, feeding and damage patterns, numbers of birds, and roosting areas.

The most common method being used to prevent dickcissel damage is bird chasers (pajareros). Usually, one or more persons have the responsibility for keeping birds out of rice and sorghum fields. This is effective and practical when patrolling pajareros use fireworks and small numbers of birds are present. It is difficult and uneconomical when large numbers of birds invade a field.

Other techniques are employed. Baiting edges of fields with Endrin-treated rice has killed many birds but is hazardous to other birds and mammals in the general vicinity. Aerial spraying with Azodrin and Di-syston is being used to kill and repel birds feeding in maturing rice and are also considered hazardous to nontarget species such as doves, kites, and other beneficial species. In some instances, high concentrations of Azodrin has been aerially sprayed at night on dickcissels in roosts. A long-term goal should be to replace these chemicals with less hazardous compounds.

Tree Ducks. Tree ducks (Dendrocygna sp.) cause locally serious problems in newly planted irrigated ricefields. At Finca Altamira, patrolling pajareros using fireworks were employed to keep feeding ducks out of fields at night. This practice is followed for about 10 days to 2 weeks after planting. Banco Nacional personnel will test Mesuro1-treated seed for repelling feeding tree ducks.

Procedures

During September and October of 1973, large numbers of dickcissels were observed in the rice growing region of Nicaragua and did cause damage. One field of sorghum was completely destroyed. John De Grazio of the Denver Wildlife Research Center and Banco Nacional personnel conducted field trials which, although not conclusive, indicate that DRC-736 (Mesuro1) may be effective in repelling dickcissels from a ripening ricefield. Heavy rains and other factors adversely affected the conducting and analysis of these tests.

Plans were drawn up for further tests during February and March of 1974 during the northward migration. This is the dry season in Nicaragua and adverse weather would not be such a limiting factor in carrying out the trials. Arrangements were made with the Banco Nacional and the USAID Mission in Managua to notify the Denver Wildlife Research Center as soon as observations indicated the arrival of the birds on their way north. Small groups of birds were noted during the last week of February. It was assumed that the greatest numbers probably would be present during mid-March.

Results and Discussion

As indicated previously, dickcissel damage is irregular and difficult to predict. This fact was borne out during this trip. During the time period March 10-21, only two groups of dickcissels were observed. The first group consisted of an estimated 500 birds and the second group contained 30-50 birds. The entire rice growing region of the Pacific side of Nicaragua was surveyed from the northern limit near Sebaco, through the major central area near Granada, Nandaime, Tipitapa, and Masaya and as far as the southern limit near Rivas. A large plantation, Hacienda Morillo, on the eastern shore of Lake Nicaragua (accessible only by air or boat) was contacted by telephone, and they also reported that no dickcissels were present. In a few instances, plantation owners or managers reported having observed small groups of birds during the previous 2 weeks, but no one reported large concentrations or damage.

As a result of the lack of birds, the primary objective of this trip was not accomplished. This is a factor which could not be anticipated and cannot be explained with any assurance of factualness. Heavy rains during the previous rainy season contributed to an abundance of weeds and other natural vegetation. Possibly these are preferred as food over rice and sorghum. The birds may have taken a more easterly route during migration and not come through the area in question or they may have passed through without stopping for extended periods. And perhaps they may be coming through later this year than they have been observed to do in the past. These are extremely difficult questions to answer.

The Bayer Chemical Company representative in Managua has made Mesuro1 available to Banco Nacional, and Dr. Sequeira will attempt to carry out field trials.

Localized damage caused by tree ducks is not believed to be of a magnitude that would justify investigation by AID/DWRC or AID/Call personnel unless it could be carried out at the same time that field trials for dickcissels are in progress.

Recommendations

Banco Nacional personnel and AID/Nicaragua should maintain their coordination and alert AID/DWRC when dickcissel concentrations and damage are encountered. Tentative plans should be made for conducting the proposed field trials at the earliest opportunity. DRC-736 (Mesuro1) is available from the Bayer representative in Managua. They were contacted during this trip and said they would make 20 kilos of the

product available for the program. The latex sticker used in the formulation is not available. AID/DWRC should ship a sufficient quantity to Dr. Sequeira via the AID Mission in Managua.

DRC-1327 is not available in Nicaragua. AID/DWRC should insure that a supply of this material is on hand in Nicaragua for proposed trials involving this agent.

Baiting platforms required for some of the proposed trials are presently under construction in Managua. These should be completed and available for use when needed.

Rodents

Introduction

While widespread high rodent populations and associated damage situations similar to those of late 1970 and early 1971 have not been encountered during the past 2 years (1972 and 1973), recent information indicates that they may be on the upswing. Banco Nacional personnel have been monitoring rodent damage situations and have been carrying out a monthly trapping survey to follow population trends. Within the past few months they have been receiving increasing numbers of reports on rodent damage, and the percentage of trap success during their monthly surveys has increased considerably in some instances. These factors may be an indication that the rodent population in general may be increasing and that serious damage problems in rice might again occur later this year or during 1975. There is speculation that a population "cycle" of about 3-4 years in length may be involved.

Results and Discussion

Reports were received of localized rodent problems, and observations of rodent damage were made on several farms. Traplines were set out on Finca Altamira, and trap success there was high as indicated in Table 4.

Table 4. Results of trapping survey March 19-20, 1974 - Finca Altamira, Nicaragua.

Line	Date	Trapnights	Site Description	Total Animals	Male	Female	% Trap Success
1	Mar. 19-20	35	Burned stubble	19	12	7	55
2	Mar. 19-20	35	Growing rice	3	2	1	9
3	Mar. 19-20	35	Mature, drained	21	10	9 (2 tails)	60
4	Mar. 19-20	35	Both sides major canal	8	4 (1 tail)	3	23
		<u>140</u>		<u>51</u>			<u>37</u>

Recommendations

The rodent trapping survey should be continued. This program will help identify the population "cycle", if it exists, and will provide forewarning of dangerous population levels. These surveys should not be restricted to one location but should be carried out throughout the rice growing area in order to obtain a more general picture of the situation.

While the trapping survey will show trends in the rodent population, this is not sufficient information on which to base a control program. In order to determine the economic justification of such an effort, the rodent population must be correlated with the amount of damage done and the actual economic losses incurred. An effort should be made to determine the point at which control efforts would be economically feasible. This requires that damage surveys also be done. The amount of damage should be converted to actual monetary loss and this compared with the costs of carrying out a control program.

LITERATURE CITED

- Bucher, E. H. 1970. Consideraciones ecologicas sobre la paloma Zenaida auriculata como plaga en Cordoba. Ministerio de Economía y Hacienda. Direccion Provincial de Asuntos Agrarios. Serie Ciencia y Technica No. 1. Cordoba, Argentina. 11 p.
- Herschkovitz, P. 1962. Evaluation of neotropical cricetine rodents. Fieldiana: Zoology, Vol. 46. Chicago Nat. Hist. Museum.
- Walker, E. P. 1964. Mammals of the world. The Johns Hopkins Press, Baltimore. Vol. I-II.

PERSONNEL AND VISITORS

Dr. Luis H. Camacho, Colombia Director of this project resigned from ICA in September and left for Teheran, Iran where he will head the FAO Grain Legumes Program.

Mr. Donald Elias and family returned to the Denver Wildlife Research Center, Colorado in October.

Jose Fernando Londono completed his studies for a Master of Science degree at the University of California at Davis in 1973 and returned to the project in January 1974. These studies were carried out under the auspices of the USAID Participant Training Program.

Preparations were begun for Danilo Valencia G. for a Master of Science degree at the Bowling Green State University in Ohio.

Peace Corps volunteers Jerry Freeman and Sean Furniss made a site orientation visit to the project during December, and they plan to cooperate with the project starting January 1975. Mr. Freeman will conduct mammal studies, and Mr. Furniss will conduct avian studies.

Peace Corps volunteers, James and Vicky Ramakka terminated and returned to the United States in June.

Mr. S. Kravetski (USAID/Washington) made an evaluation visit to the project's facilities in February.

Messrs. Charles A. Britenback and Guy B. Baird (USAID/Washington (LA-RDO and Agr.-TAB) visited the project's facilities in May.

Mr. Nelson Kverno (DWRC) visited the project in May to coordinate research plans for FY 1974-1975 and to discuss the future of station.

Dr. Nelson Konnerup (USAID/Washington-TAB) met with the project personnel in May to discuss the future of the project while attending a meeting at CIAT.

Dr. Dan Thompson (DWRC) visited the station in July to interview a possible future candidate for the project.

Mr. John De Grazio (DWRC) visited the station in September to clarify the future status of the project.

Dr. Alfred Gardner (USFWS/Washington-Bird and Mammal Laboratories) visited the station in October.

Messrs. Jack Sullivan and Charles Paolillo (USDS/Washington-Comm. on Foreign Affairs) visited the station in October while visiting other USDS projects in the Cauca Valley.

Mr. George S. Eason (USAID/Guyana-RDO) and Harry Madromootoo (Dir. Guyana Rice Board-Georgetown) visited the station in October to discuss vertebrate problems in rice.

FUTURE STATUS OF STATION

The future of the station and the project is not known. One USAID/USFWS position was terminated in October and the other will be vacated in June 1975. Whether USAID/USFWS will continue to provide technical support to ICA/Colombia after July 1975 is unknown.