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VERTEBRATE DAMAGE CONTROL RESEARCH
QUELEA BIRD PROBLEMS IN AFRICAN AGRICULTURE

1972 ANNUAL REPORT



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Office of Agriculture and Fisheries
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**U.S. DEPARTMENT OF
THE INTERIOR**

Bureau of Sport Fisheries and Wildlife
Division of Wildlife Research
Denver Wildlife Research Center

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1972 ANNUAL PROGRESS REPORT*

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ABSTRACT*

One trip to Africa was made in 1972 with four primary objectives: (1) to further investigate bird and rodent damage problems in Senegal, Liberia, Ghana, Nigeria, Chad, and Cameroon; (2) to accompany FAO personnel in Chad to rice damage areas in Chad and Cameroon; (3) to discuss research findings in Africa with FAO personnel in Rome; and (4) to develop plans for an AID/BSFW research program in Africa. Aspects of the problem were reviewed; basic information on distribution, reproduction, food habits, and damage by quelea was obtained from the literature and from knowledgeable workers. A number of recommendations pertinent to the problems are suggested.

Quelea has been reported to adversely affect the economy of 25 nations in Africa and has the distinction of being the most numerous and destructive bird in the world. Quelea damage millet, sorghum, rice, and wheat. Recognition of the problem dates back to the late 1800's, but has only recently received international attention.

Since 1950, many methods of quelea control have been devised and millions of birds have been destroyed. Aerial applications with high concentrations of very potent pesticides in roosting and nesting sites is the damage control method currently being used almost exclusively by many governments in Africa. Although heavy annual kills are made, populations have not decreased, indicating simply that surplus birds are being harvested.

Present bird control techniques need refining and other methods of crop protection should be investigated and developed. Basic research on bird behavior, movement, damage, and on selective chemicals are also requirements for the future. FAO personnel headquartered at Ft. Lamy, Chad, have begun much of this basic research. It is recommended that AID/BSFW become directly involved in the quelea problem by establishing a research project early in 1973.

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INTRODUCTION

Bird damage to agricultural crops has been a chronic problem in many parts of the world. Although considerable effort has been expended in highly developed countries to solve local or regional bird damage problems, only recently has a significant effort been made in the developing nations. In Africa, major research has been directed by the British, French, and Germans, through technical assistance programs, and more recently by FAO.

The red-billed weaver or black-faced dioch (Quelea quelea) has the distinction of being the most numerous avian species in the world, and perhaps the most destructive. Damage reportedly caused by this species (hereafter referred to as quelea) dates back to 1890, but has received international attention only since about 1950. Quelea range over about 20% (2 million square miles) of the land area of Africa and adversely affect the economies of 25 nations. Crops affected include millet, sorghum, rice, and wheat. The quelea is morphologically similar to the house sparrow (Passer domesticus), but weighs less (quelea 18 g, house sparrows 25 g). The natural diet of quelea consists of small grass seeds, but when these preferred foods become scarce, damage to crops can occur. However, damage in many areas is sporadic and unpredictable.

Since 1950, many methods of killing quelea have been used and hundreds of millions of birds have been destroyed. Present control techniques now include explosives and aerial applications of toxic pesticides (parathion and fenthion) to roosting and nesting sites. These control methods, however have not appreciably reduced population levels nor effectively decreased crop damage, except in some local areas; thus, better control methods are required.

Present control techniques need refining and other methods of crop protection should be investigated and developed. Basic research on bird behavior, movement, damage, and on more selective chemicals are also requirements for the future if control methods are to be appreciably improved. FAO personnel headquartered at Ft. Lamy, Chad, have recently begun much of this basic research. Personnel of the Denver Wildlife Research Center cooperated with FAO during field trips to Africa; one by J. F. Besser in March 1971 and one by J. W. De Grazio and E. W. Schafer in November 1971. (Results reported in 1971 Annual Progress Report.)

BIRD AND MAMMAL DAMAGE PROBLEMS IN SENEGAL

In Senegal at Dakar, Ross-Bethio, and Richard-Toll, personnel of the following organizations were contacted: US/AID, OCLALAV, ORSTOM, SAED, FAO, University of Dakar, and IRAT. Mr. J. Castel (Technical Director, OCLALAV) kindly arranged meetings and tours of crop-growing areas in the Senegal Valley. Problems encountered and observations are summarized below.

Damage to Maturing Rice in the Lower Senegal Valley

Major species causing damage to maturing rice in the Lower Senegal Valley are the golden sparrow (Passer luteus), black-faced dioch (Quelea quelea), and the bishop weaver (Euplectes afra). Damage can occur from early September to late November, dependent on rains. In the Ross-Bethio area the same species cause damage from mid-November to January. In April 1971 the rice crop at Podor was abandoned because of severe damage by weaver birds (Ploceus sp.).

Damage to Maturing Sorghum in the Lower and Middle Senegal Valley

Maturing sorghum is damaged primarily by the golden sparrow. Depending on rains and resultant flooding, large or small acreages of sorghum are planted on the river plain. In this large area, damage can extend from January to April.

Damage to Emergent Rice in the Richard-Toll and Ross-Bethio Areas

IRAT personnel at Richard-Toll report a problem with ruffs (Philomachus pugnax) and ducks feeding on newly planted rice in December. Ruffs (European migrants) feed on the newly planted seed, and ducks feed on the rice after it emerges. In 1971, 100 of 2,000 acres were reported destroyed, but the damage intensity varies from year to year.

The same damage was reported by SAED personnel on their rice scheme at Ross-Bethio. Ducks damage emergent rice in the area in July and August shortly after flooding. Doves and quelea also feed on seeded rice before flooding in this same area during July and August.

Rat Damage to Rice and Sugarcane

Rat (Arvicanthis sp.) damage to rice and sugarcane is apparently not a severe problem in the Richard-Toll and Ross-Bethio area. Coumadin is used to control rats by placing bait in boxes. Personnel report good control and negligible damage if baited annually. Rats also weaken ditch banks and dikes during September and November in the rice-growing area of Ross-Bethio.

Other Damage Problems

In the Ross-Bethio area, warthogs (Phacochoerus aethiopicus) damage ripening rice from the end of October to early March, especially after water is drained from fields prior to harvest.

North of Ross-Bethio at Boundoum, 80 hectares of experimental irrigated rice being tested by SAED was reportedly suffering bird damage. We observed that bird damage was almost nonexistent, but there were some plants damaged by larval insects that caused the seed head to turn white thus resembling bird damage.

Also near Ross-Bethio at Savaigne, birds were reported to have caused as much as 20% loss to tomatoes by pecking the ripening fruit. We observed several species of birds in the fields but no damage.

Reports from Mali, at the headwaters of the Senegal River, indicated that parrots or parakeets cause damage to maturing sorghum in January and February. The birds also damage date palms in Mauritania near Kankassa and Tiksikda.

Bird Damage Control in Senegal

Operational crop protection teams of OCLALAV begin control activities in the Upper Senegal Valley and proceed to the Central and Lower Valley as crops ripen and become vulnerable to bird attack. Current control methods are explosives in roosts, parathion and fenthion in roosts, and phosdrin in watering holes. Some operations are expensive and in many situations control may not be justified.

Recommendations

1. Bird damage to emergent rice in the Richard-Toll and Ross-Bethio areas should be further investigated. A repellent chemical, Methiocarb, successfully used in the United States by Bird Section personnel of the DWRC, should be evaluated under African conditions. This same problem occurs in other African countries, and if tests are successful, the chemical and instructions for its use could be furnished to OCLALAV for possible use in other countries.
2. Involvement is not recommended on bird damage to maturing rice and sorghum. It appears that reductional control efforts by OCLALAV personnel could hamper research efforts and a less disturbed area in another country with the same problem would be more desirable. Also, rice in the Richard-Toll area is being replaced by sugarcane.

3. Involvement is not recommended on rat damage to rice and sugarcane in Senegal because it does not appear to be a serious problem.

BIRD DAMAGE PROBLEMS IN GHANA

In Ghana at Accra, personnel of the following organizations were contacted: US/AID, FAO, Council for Scientific and Industrial Research (CSIR), and the Cons. of Forestry. Only two bird damage problems were of significance and one of major importance.

Bird Damage to Coconut and Oil Palms

Discussions with Dr. K. M. Sape, CSIR, revealed that weaver birds reduce coconut and oil palm fruit yields by stripping palm fronds for nests. Coconut and oil palm crops make up 60% of Ghana's economy and 80% of their foreign exchange. No national loss figures are available, but at the Bunso Experiment Station, 6-year yield records showed that defoliated oil palms produced 30% to 40% fewer fruits than undamaged palms. The palm industry is primarily in the southern part of the country and damage is apparently most serious when the rains end from September to November.

Bird Damage to Maturing Rice, Millet, and Sorghum

In northern Ghana, queleas and other birds cause losses to rice, millet, and sorghum. Damage occurs from September to November, but seriousness of the problem is unknown.

Recommendations

1. It is recommended that DWRC become involved in the problem of weavers reducing palm yields. A program in cooperation with CSIR should be initiated, but will require TDY assignments to Ghana.
2. Apparently damage to cereal grains is not serious enough to warrant special study.

BIRD DAMAGE PROBLEMS IN NIGERIA

In Nigeria at Lagos, US/AID personnel were contacted, but attempts to contact FAO and Ministry of Agriculture were unsuccessful.

Currently, German Technical Assistance (GTA), personnel have an active research program underway near Maidugari in northern Nigeria. This team is interested in developing aerial and ground application techniques

with avicides such as parathion and fenthion. The GTA is cooperating with FAO in Chad. The Center for Overseas Pest Research (COPR) has plans to locate a team in Nigeria to study basic quelea biology.

Bird Damage to Coconut and Oil Palms

Weavers damage palms in Nigeria as well as Ghana; however, the problem is apparently not as serious in Nigeria.

Bird Damage to Maturing Rice, Millet, and Sorghum

In crop-growing areas of northern Nigeria, queleas and other birds damage cereal grains. The problem is similar to those reported in Ghana, Chad, and Cameroon.

Recommendations

1. DWRC personnel should keep informed of bird damage control research being conducted by GTA and COPR personnel at Maiduguri through correspondence and periodic visits.

BIRD AND RODENT DAMAGE PROBLEMS IN LIBERIA

The following information was obtained from Peter Park, Pest Control Specialist, FAO in Chad, who discussed damage problems with FAO personnel stationed in Liberia in January 1972.

Bird Damage to Maturing Rice

Weavers and Manakins (Spermestes sp.) damage rice in northwest Liberia at the FAO Project Experimental Farm near Suakoko. Potential damage to dry-season rice is so great that other crops may have to be substituted for rice. Some damage also occurs to wet-season rice.

Rodent Damage to All Stages of Rice

Serious rodent damage occurs to all stages of rice in Nigeria from Suakoko to Voinjama. Damage occurs throughout the growing season but is probably most severe during the rainy season, April to October, when rice is 8-10 inches high. Preliminary data indicate that rats, mice, and voles cause the damage. At the FAO farm at Suakoko, trapping and wire enclosures have not reduced damage.

Recommendations

1. Contact has been made with FAO personnel in Liberia; they are to provide more details on the rodent problem and, if considered serious enough, a cooperative control plan may be formulated.

BIRD DAMAGE PROBLEMS IN CHAD-CAMEROON

Additional information was obtained on bird damage problems in Chad and Cameroon through discussions with personnel of FAO, OCLALAV, U.S. Embassy, ORSTOM, Peace Corps, and Chinese AID (Taiwan).

Bird Damage to Emerging, Young, and Maturing Rice

At Bongor, Chad, and Yagoua, Cameroon, on experimental government-irrigated rice schemes, tree ducks (Dendrocygna sp.) and ruffs damage newly planted and emergent seed rice. Damage occurs in December. In December 1971, 4 hectares of seed rice were reported 90% destroyed.

Also at Bongor and Yagoua, crowned cranes (Balearica regulorum) browse on young rice plants (8-10 inches) in January and February. Quelea and other birds damage maturing rice in the same area during May and June.

Bird Damage to Ripening Wheat and Corn

Quelea, weavers, and golden sparrows cause heavy losses to ripening wheat in February near Bol, Chad, at the FAO-IRAT Experimental Farm. In 1971, crops were abandoned because of the damage and because of no protection (man patrol). Some corn is grown on the Farm and the village weaver causes most of the damage, which occurs in June.

Other Information

Near Bongor, FAO personnel were assisted in collecting about 200 queleas with mist nets and by shooting as they returned to a willox (Salix sp.) roost. The birds' stomachs contained weed and grass seeds, but no rice, even though the roost was only 17 km from a damage site in rice near Bol.

At the rice scheme near Bongor, we broadcast 4-aminopyridine-treated millet along paddy dikes in a rice damage area. Quelea prefer to land and feed in rice, however, and did not frequent the dikes; hence, other techniques will have to be tested.

At Fort Lamy, the proposed AID Africa position and tentative cooperation with FAO personnel were discussed (see Addendum).

Recommendations

1. Bird damage to emerging rice should be studied cooperatively with FAO using repellent chemicals. After establishing a test design, DWRC will supply chemical samples and instructions for use.
2. Crowned cranes' damage to rice can probably be prevented best with exploding frightening devices. Arrangements will be made with FAO for appropriate testing.
3. Recommendations were made to FAO regarding reducing quelea and other bird damage in maturing rice with Methiocarb head spray, 4-aminopyridine in bait troughs, and frightening devices.
4. Arrangements were made with FAO at Bol to plant experimental wheat and test Methiocarb head spray, 4-aminopyridine ground bait, and Al. Am. Sul. for controlling quelea and other bird damage.

DISCUSSIONS IN ROME WITH FAO PERSONNEL

Discussions on bird and rodent damage problems and on the proposed AID position in Africa were held at FAO headquarters in Rome with Dr. Ling, FAO Director, and with Drs. Buyckx and Shuyler, Plant Protection Division.

It was proposed that standard research guidelines be developed through an international approach. For example, chemical screening procedures need standardization when applicable, and data obtained can be meaningfully compared. This proposal was well received in Rome and will be further pursued with other international organizations.

Initially, the FAO quelea project in Chad had difficulties because of recruitment problems and an illness by the first project manager. Presently, the project is well staffed and is making progress; it is scheduled to continue until June 30, 1973, with a 3-year extension almost guaranteed.

FAO personnel were asked to comment on the proposed AID Africa position. They stated that AID should provide technical support to the FAO team in Chad and establish the position in East Africa or Chad, with duties of our choosing.

ADDENDUM

THE NEED FOR US/AID RESEARCH ASSISTANCE OF QUELEA BIRDS IN EAST AFRICA

INTRODUCTION

Quelea Problem in Africa

The black-faced dioch (Quelea quelea) is one of the most serious agricultural pests in Africa and is known to adversely affect the economies of more than 20 nations by its depredations to small grain crops.

Presently, the problem is being investigated by three organizations. The FAO Project Quelea headquarters at Fort Lamy, Chad, is conducting research in an 11-country area covering all the quelea habitat between Senegal and Sudan, and a FAO ornithologist is studying the quelea in Somalia. German Technical Assistance (GTA) is working in Northeastern Nigeria. The Centre for Overseas Pest Research (COPR) intends to install an ornithologist to supplement the GTA program.

The FAO project proposes to promote crop protection in cooperating countries by improving methods for the control of grain-eating birds, primarily Quelea quelea.

Toward this goal, the project collects scientific information on the ecology, population dynamics, and migration patterns of quelea. New and existing quelea control methods are investigated, and counterpart personnel are trained in research and in the control techniques developed. Considerable progress has been made, but an important deficiency exists in East Africa where there are few bird control experts.

PROPOSED DUTIES OF THE AID POSITION

FAO personnel and others have expertise, or are currently working on ecology, population dynamics, migration patterns, and aspects of chemical spraying, so the position should not greatly overlap these areas.

Conduct Damage Appraisals

One of the major objectives of the position is to evaluate and assess damage caused by quelea and other birds to cereal grains such as rice, sorghum, wheat, and millet. This will require modifying known, or developing new, assessment techniques. Season, location, severity, and

extent of damage will be determined for the crops affected. Damage potential by quelea and other birds will also be included. Other work can be pursued while gathering other biological data and while conducting damage control field tests.

Conduct Surveys

Another major objective will be to locate quelea concentrations and damage areas. This information may be obtained by questionnaire, contacting other interested agencies and workers, and direct observation. In some African countries, FAO and COPR have this information available. However, in Ethiopia this information is lacking and is necessary for developing an effective damage control program.

Evaluation of Baits and Baiting Techniques

Another important research area is developing effective baits and baiting techniques. Denver Wildlife Center biologists have experience in this area and application of this knowledge may be valuable in many situations in Africa. To determine the most specific chemicals and attractive baits, tests will be conducted in cages. Then, in the field, the best combination will be tested in staging, water, and crop areas or near roosting and nesting sites. Discovery of a well-accepted bait is necessary for safe and economical use of chemical repellents, fright-inducing agents, and oral toxicants.

Evaluation of Mechanical Frightening Devices

The effectiveness of conventional inexpensive scaring devices such as patrolling, shooting, firecrackers, and carbide exploders, should be evaluated, particularly on small acreages. The elaborate devices such as recorded distress calls and high-frequency sounds, may not be practical in most African situations. Frightening methods may also have utility at roosting and nesting sites.

Chemical Studies

The Denver Center has much expertise with chemical repellents, fright-inducing agents, and oral toxicants.

1. Repellents: Repellent head sprays have been effective in protecting crops in the United States and this information should be applicable to some African situations. In Africa, probable adaptations would involve application of methods, formulations, and concentrations developed by the Denver Center. Repellent seed treatment has reduced damage to emergent grains and should also be evaluated in Africa.

Damage to newly seeded and emergent crops is reported to be serious, especially in high-value crops such as seed rice.

2. Fright-inducing Agents: A chemical fright-inducing agent applied to baits and broadcast in cornfields has reduced damage in the United States. Under African conditions, this technique and head sprays should be checked where maturing crops are being damaged. Treated baits should also be tested to determine if they frighten birds from water holes and roosting and nesting sites.
3. Oral Toxicants: Selective oral toxicants applied to grain baits should be tested. Oral toxicants are currently being used in the United States to reduce bird damage in cattle feedlots. This same technique could apply in Africa in staging areas, water holes, roosting and nesting sites, and perhaps in crops.

DURATION OF PROPOSED POSITION

The position should be filled in Africa as soon as possible. For a 3-month period, the work should be located at Fort Lamy in cooperation with the FAO staff. During this time, the incumbent can become acquainted with project activities by traveling with FAO to meet knowledgeable workers, and to participate in field activities. After the 3-month introductory period, the position should be switched to the most appropriate site in East Africa.

SUPPORT AND COOPERATION

Back-up Research from the Denver Center

The Denver Center can contribute assistance in both the biological and chemical phases of research, including temporary duty on field testing of candidate chemical compounds. It is also possible that the Denver Center can conduct a modest chemical screening program to search for selective chemicals using indicator species.

Other Cooperation

Close cooperation is expected from various groups such as OCLALAV, ORSTOM (French Research Organization), and universities and ministries in West Africa; and FAO, Desert Locust Control Organizations (DLCO), OCLALAV, GTA, and COPRA in Eastern and Central Africa.

The AID incumbent will participate in group meetings, when desirable, and may serve on appropriate technical committees.