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MAMMALS AND BIRDS AFFECTING FOOD PRODUCTION AND STORAGE IN NIGERIA

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INTRODUCTION

The systematic study of the roles of vertebrate pests in agriculture in Nigeria is relatively very young, having spanned only two decades. During this period the species composition of vertebrate pests has been determined in some important crop plants like cocoa (Taylor 1961, Everard 1968), oil palm (Greaves 1964), maize (Everard 1966; Funmilayo 1976) and rice (Funmilayo and Akande 1977).

The ecology of a few important pest species has been studied. Because of its devastating destruction of many graminaceous crops in Nigeria and over most parts of Africa, the red-billed quelea (Quelea quelea) has been studied more intensively than other avian pests (Crook 1957; Crook and Ward 1968; Mallamaire 1959; Pope and Ward 1972; Park 1974; Ward 1965 a-d, 1966, 1971, 1972, 1973). Other avian pests whose ecology has been studied include the village weaverbird (Funmilayo 1975; Funmilayo and Akande 1976) and the bush fowl (Akande 1979).

The ecology of some mammalian pests has also been studied (Ajayi 1975; Funmilayo 1975, 1979; Anadu 1976; Funmilayo and Akande 1979). A research programme has been started at the University of Ibadan on the management, domestication and breeding of one of the most notorious rodent pests in Nigeria, the cane rat (Thryonomys swinderianus).

The present report presents an up-to-date knowledge of the identity of those mammals and birds that cause damage on farmlands and in stores.

METHODS

Pestiferous birds and mammals were identified using various methods. Birds and mammals were captured in large numbers in farmlands all over Nigeria and their gut contents were examined for remnants of crop plants. In a particular instance, rice grains were dyed bright green and planted and the stomachs of vertebrates captured in the treated fields were examined (Funmilayo and Akande 1977). The green color lined the stomachs of animals which consumed treated grains and thereby helped to overcome some of the difficulties of identifying finely-ground food remnants in stomach contents and also to confirm those species capable of removing planted grains.

In most cases, it was possible to confirm the results of stomach content examinations with visual observations of vertebrate pests feeding in situ on crop plants. The last situation was possible because a majority of vertebrate pest species are diurnal in their feeding activities. Many vertebrates, particularly the gregarious species, make noise while feeding and this noise has been useful in determining the location of pest species in croplands. Visual observations of pest activities in farmlands have also made possible the accurate description of the types of damage caused by each of the different species of vertebrate pests.

AVIAN PESTS

Many species of herbivorous birds cause damage to crop plants (Table 1). The majority of avian pests are weaverbirds (Family: Ploceidae) which cause serious damage to cereals - maize, rice, sorghum, millet and wheat - which are cultivated in many parts of Nigeria and form the staple diet in many localities. Pestiferous weaverbirds live and feed gregariously and are therefore able to inflict devastating damage on a cereal crop within a short time. The most notorious of the weaverbirds, the Quelea (Q. quelea) occurs in huge colonies of up to a million birds in the northern parts of Nigeria and has been known to totally liquidate many cereal farms. The village weaverbird (Ploceus cucullatus) and the red-headed dioch (Quelea erythropus) of southern Nigeria are much less numerically abundant as the quelea but nonetheless cause damage of comparable dimensions as the quelea within their distribution range.

The small fruits of graminaceous crops like guinea corn, rice, wheat and millet are consumed by several species of weaverbirds from the milk to the dough stage. The ripe fruits are consumed as long as they are available on the field, making early harvesting an important control measure. Only two species, the village weaverbird (P. cucullatus) and the chestnut-and-black weaverbird (P. nigerrimus) are able to peck and consume maize grains, and only at the limited period when the grains are milky. P. cucullatus and P. nigerrimus also cause defoliation, and sometimes death, of many economic trees e.g. oil palm, coconut palm, plantain, banana) whose leaves are removed for the incessant nest building, and many other trees on which the numerous nests in a colony are situated.

Three species of doves, the laughing dove (Stigmatopelia senegalensis), the red-billed wood dove (Turfur afer) and the red-eyed turtle dove (Streptopelia semitorquata) and the crake (Crecopsis egregia) are capable of removing small planted seeds. The red-eyed turtle dove may become gregarious and cause massive damage to freshly sown grains in certain localities.

Table 1. Avian and mammalian pests of crop plants in Nigeria.

Pests	Materials damaged	Mode of damage	Severity of damage
Birds			
Bush fowl (F. bicalcaratus)	small and large seeds	consumption	severe
	tubers	consumption	minor
	roots	consumption	moderate
Crake (C. egregia)	small seeds	consumption	minor to moderate
Red-eyed turtle dove	small and medium seeds	consumption	minor-moderate
Red-billed wood dove	small seeds	consumption	minor
Laughing dove	small seeds	consumption	minor
Village weaverbird (P. cucullatus)	cereal fruits	consumption	severe
Chestnut-and-black weaverbird (P. nigerrimum)	oil palm fruits	consumption	minor
	oil palm leaves	nesting	severe
	coconut palm leaves	nesting	severe
	banana leaves	nesting	moderate
	plantain leaves	nesting	moderate
Red-headed quelea (Q. erythropus)	small cereal fruits	consumption	severe
Black-faced quelea (Q. quelea)	small cereal fruits	consumption	severe
Bronze mannikin (L. cucullatus)	small cereal fruits	consumption	moderate
	ripe tomato fruits	consumption	minor
Blue-billed mannikin (L. bicolor)	small cereal fruits	consumption	minor
Ruff (P. pugnax)	rice seedlings)	trampling and	
Black-faced godwit (L. limosa)	rice seedlings)	consumption	moderate
Garganey (A. querquedula)	rice seedlings)	and fouling of water	
Mammals			
Rats, mice, gerbils and ground squirrels	sown seeds, seedlings, stems, unharvested and post-harvest fruits, roots and tubers	consumption, cutting and chewing	moderate to severe
Tree squirrels	bark of trees, buds and fruits	consumption	moderate
Fruit bats	fruits, stems and leaves	consumption and roosting	moderate
Primates	fruits and leaves	consumption	locally severe
Ungulates	bark of trees, fruits and young plants	consumption and trampling	minor to moderate

The bush fowl (Francolinus bicalcaratus) is a pest of both small and large planted seeds and seedlings, often causing total loss. The bush fowl also exposes and pecks yam tubers and cassava roots causing minor quantitative loss but much qualitative devaluation.

Apart from the avian pest species mentioned above, there are a few others which could cause severe losses in particular localities but whose effects on the overall food production in Nigeria is negligible.

MAMMALIAN PESTS

The mammalian pests (Table 1) include our smallest mammal, the pigmy mouse (Mus (Leggada) musculoides) which digs and consumes planted seeds, and our largest terrestrial mammal, the African elephant (Loxodonta africana), which has been implicated in the trampling of several crop plants.

The most important group of pestiferous mammals are the rodents which include rats and mice, squirrels and dormice. Rats and mice (Muridae) consume sown and ripe fruits and also cut young and feeble stems of both crop plants and tree seedlings. More than ten species of rats and mice are pestiferous on up to twenty or more crop plants. The most important rats and mice pests belong to the genera Rattus, Mastomys, Arvicanthis, Dasymys, Lophuromys, Lemniscomys, Praomys, Uranomys, Hybyomys and Mus. Gerbils and Giant Rats (Cricetidae) are able to burrow extensively and also cause losses similar to rats and mice. The cane rat or ground-hog (Thryonomyidae) is the most important mammalian pest in the field, damaging over twelve varieties of crop plants by cutting the stems and consuming the soft inner tissues and fruits. The porcupine (Hystricidae) is a pest of roots and tubers. Squirrels (Sciuridae) contain three genera (Funisciurus, Heliosciurus and Protoxerus) of tree squirrels which strip the bark off trees but more importantly consume ripe fruits. The red-legged

ground squirrel, Xerus erythropus, causes damage similar to those caused by rats and mice. Dormice (Gliridae) of the species Graphiurus hueti is a pest of ripe cocoa pods and beans.

Other important mammalian pests include fruit bats (Pteropidae) of the species Eidolon helvum which consume the succulent ripe fruits of many plants like mango, guava and pawpaw and also kill many economic trees (e.g. oil palm trees) on which they roost.

Hares and rabbits (Leporidae) may become troublesome in nurseries and maize plantations. Monkeys of the genus Cercopithecus (Cercopithecidae) may cause local severe damage to ripe cocoa and kola pods and maize ears. Ungulates like the bush pig (Potamochoerus porcus), the harnessed antelope (Tragelaphus scriptus) and a few other species also consume a variety of roots, tubers, fruits, leaves and tree barks.

POST-HARVEST AVIAN AND MAMMALIAN PESTS

Many of the pest species listed above can damage post-harvest crop before it is removed from the field. For instance, large numbers of the multimammate rat (M. natalensis) are known to live inside piles of rice panicles harvested and left in the field and to consume a substantial proportion of the fruits before the panicles are threshed and removed to the store. No bird has been implicated in any serious post-harvest damage.

Only three species of rats (Rattus rattus, Mastomys natalensis and Cricetomys gambianus) have been captured consistently and in appreciable numbers during extensive trapping in infested mills, warehouses, commercial stores and domestic pantries. In numerical abundance and wide distribution the ship or roof rat (R. rattus) is the most important storage pest while the multimammate rat (M. natalensis) occurs sometimes in large numbers in buildings situated close to farmlands and secondary forests. The giant rat (C. gambianus) enters buildings only occasionally though it could easily gain access at night through open doors and windows and dry water drainage channels. All three species of commensal rats are capable of climbing, burrowing and gnawing through wood, mud-wall and chicken-wire to gain entry into buildings containing their favored food materials. All varieties of stored primary and processed food materials are exposed, contaminated and consumed by these rats. C. gambianus also hoards materials, which enhances its ability to cause losses of items on which it feeds. R. rattus is also known to enter poultry houses and rabbitries to kill and consume chickens and rabbit kittens.

QUANTITATIVE ASSESSMENT OF LOSSES

Damage caused by mammals and birds may vary considerably within a given locality, seasonally and in different crops. Damage occurs in almost all our crops though it could be very small when pest density is low but massive or total when gregarious feeders like weaverbirds descend on a cereal farm.

There are a few records of measurement of crop losses. Taylor (1961) estimated the average loss in cocoa pods in West Africa due to the attack by mammals to be 4.6%, but found up to 12% loss in some plots. Everard (1968) found losses caused by mammals to cocoa at Ibadan to vary between 2.2% and 11.8%. Greaves (1964) estimated that up to 80% of oil palm seedlings could be killed by rodents within the first three years of planting. Losses caused by rodent attack on maize ears in Moor Plantation, Ibadan, has also been put at 22.4% by Everard (1966) while measurements made at the University of Ibadan by Funmilayo (1976) indicated that 44.29% of maize ears were damaged by rats and weaverbirds. Funmilayo and Akande (1977) estimated the pre-harvest losses in rice farms in southwestern Nigeria to amount to 37% of the potential crop yield while rodent attacks caused a loss of about 5% of the harvested yield.

DISCUSSION

Damage by mammals and birds to crop plants is a common phenomenon in all parts of Nigeria. Some crops, mainly cereals, legumes and cowpeas, are susceptible to attack during the whole of their life span on the field while some, like roots and tubers are more commonly attacked at maturity. Mammals and birds attack crop plants mainly to obtain food but in a few instances the roosting and nesting activities of some gregarious species like village weaverbirds (Funmilayo and Akande 1976) and the straw-coloured fruit bats (Funmilayo 1976) may cause defoliation and serious mechanical damage resulting in the failure of the trees to produce fruits. Field research has shown that most of the mammals and birds found in agro-ecosystems can cause damage of some sort to crops but it is important to distinguish between small and terminal damage and large and potentially severe damage. It is invariably better to ignore minor damage, and this is usually the attitude of local farmers. Control efforts should therefore be directed towards potentially dangerous pest situations.

Control of field vertebrate pests using modern methods like chemical repellents and pesticides is in a very rudimentary stage in Nigeria, being employed only in government and institutional farms, which are invariably relatively large. Traditional methods like human scaring, snaring, trapping and repelling with "juju" are still employed by a majority of farmers. The efficiency of traditional methods of control is enhanced by the small size of farms and the employment of a tremendous reservoir of undocumented indigenous knowledge on the ecology of vertebrate pest species. Therefore, in Nigeria, the use of traditional methods of control still saves more quantity of crop from vertebrate pest damage than the use of modern techniques. However, as mechanization improves and farms become larger, traditional methods of control will become inefficient.

Post-harvest losses could be considerably reduced by storing harvested food in clean, rat-proof premises. It is imperative that mills, warehouses, stores and domestic pantries should be made rat-proof from the construction stage and thereafter regularly examined to ensure that the rat-proofing is not undermined by rats.

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