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The nations of East Africa consist of Ethiopia, Somalia, Kenya, Uganda, Tanzania, Malawi, Mozambique and Zimbabwe. They encompass a widely varied topography, from coral strands to snow-capped mountains, rain forests to deserts, and tropical to temperate. In all these areas where soil and rainfall patterns permit, agricultural crops are grown. For the most part farming is of a subsistence nature being small single family plots.

These farms make up to 90% of the farming in most of the East African nations. There are large farms in Kenya and Zimbabwe generally confined to the temperate uplands. Elsewhere there are large government agricultural schemes growing food crops like rice and sugar cane. In Tanzania there are very large sisal plantations.

Almost all of the nations of East Africa have chronic food shortages save Malawi and Zimbabwe. This is due to declining food production and a rapid annual increase in the human population. This has made it necessary for many of these nations to import food or to become dependent on donated foods. The purchase of foods has slowed the development of these nations as scarce foreign exchange has to be used for this purpose instead of buying machines, supplies, and technology necessary for development.

The above problems are compounded by the weather problems common to East Africa. In recent years there have been some severe droughts in portions of East Africa. Add to this the localized ones that seem to occur almost every year. The East African Monsoon brings the rains to most of the countries in this area. They can best be regarded as fickle. Rainfall is scattered and random both in timing, location, and amount. In general, the rainfall comes during two periods with some geographical and local variations. The Long Rains generally fall from March through May, the Short Rains from November to January.

Food production is dependent on ample long rains since little irrigation is practiced in East Africa by subsistence farmers. The short rains are just that and also much lighter in rainfall amounts. At times they totally fail to materialize. Few farmers plant for the short rains due to the above and rodent problems.

East Africa has a wide variety of rodents. Most of them are endemic, and of these only a few are of any economic importance. They are field and crop rodents; seldom are they involved in stored food losses except at the village level and then only during times of extreme rodent abundance. Of these rodents the one of most economic importance is the multimammate mouse, Mastomys (Praomys) natalensis. It is probably the fastest breeding rodent in the world. I have observed dissected females with 23 embryos. Raising litters of 12 is not uncommon. It favors cultivated lands, cornfields in particular. It is a tropical-to-subtropical rodent generally found in low-level farming areas. It is uncommon in unfarmed areas; fields are its favorite. In the higher more temperate areas of East Africa it is replaced by the grass rat, Arvicanthus niloticus. As a pest it is as bad as the multimammate mouse under suitable conditions. There are other pest rodents and they can cause localized damage to crops.

The other pest rodents are the ever-present roof rat, Rattus rattus, the house mouse, Mus musculus, and the Norway rat, Rattus norvegicus. The first two are found all over East Africa wherever dwellings or shops are found, even in remote clusters of mud and thatch dwellings in remote semi desert areas of Somalia. The roof rat is never found as a field pest in East Africa. The house mouse may be a field problem in areas near villages. The Norway rat is found in the ports of East Africa and in the towns along the railroad lines. It is quite common in the more temperate highland towns where it is a major pest.

As a result, villagers have two rodent problems: one set of rodents in the fields that are seasonally abundant, and those in their dwellings that are present the year-round.

The Food and Agricultural Organization of the United Nations along with other international aid organizations, have long been aware of East Africa's food problems and the portion lost to rodents. For East Africa as well as other developing nations FAO designed a set of projects to aid in the reduction of food shortages. They are called PFL, or Prevention of Food Losses. The idea is to save food at the source with the eventual goal of ending food imports. One of these was a rodent control project in Somalia.

Somalia had severe crop damage due to rodents in 1977 (Barre 1978). FAO responded to a request for aid on this problem by providing a consultant (Kurylas 1978), and supplying 120 tons of Tomorin II master mix rodenticide. This was enough anticoagulant to mix 4,800 tons of bait. To accomplish this, a bulk bait-mixing plant was built in Afgoi, a town 20 km south of the nation's capitol, Mogadishu. By the time all this was in place the rodent irruption had largely abated, being quite seasonal. Even with all this aid, finished bait production was limited by a shortage of bait material, corn. Somalia is chronically short of food grain even to feed its people. Much has to be imported.

After a request from the government of Somalia, FAO designed a proposal for a Rodent Control Project and found a donor, the Government of the Netherlands, to finance it. It was titled GCP/027/SOM/

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NET, "Prevention of Food Losses Through Rodent Control." In January of 1981 I arrived in Somalia to head this two-year project. Initial efforts were to initiate training of government staff members while awaiting the arrival of field and lab supplies. During this time period Somalia was facing a severe drought and rodents to demonstrate anything were almost impossible to obtain. Emphasis was spent on staff training and, when possible, conduct workshops in cooperation with USAID, other FAO projects, and the Peoples Republic of China. Three national staff members were sent to the Vertebrate Pest Control Centre in Karachi, Pakistan, for several months each of pragmatic training. My counterpart made a 3-month study tour of the USA. At the end of the project, trained staff was in place and had adequate supplies to carry out their duties. However, the government was unable to give them any financial support due to other pressing economic problems.

Attempts were made to carry training into the field. This had to be done during the noncrop dry season since all of the major crop areas of Somalia are impassable due to muddy roads during problem times. We also asked the government to supply Tomorin II stocks to central farming area locations. This was difficult to do since transportation was lacking.

By the time the project finished, over 1,000 people had received some form of rodent control training. "How to" information was left to be translated into Somali and distributed by the Ministry of Agriculture (Smythe 1983).

Other international aid organizations were also concerned with the rodent problems facing other East African nations. The Danish international development agency responded to a plea for help from Tanzania. They also had rodent problems in the late 1970s. Taylor (1976) and Greaves (1980) made reports to DANIDA on rodent problems. Dr. M. Lund also visited Tanzania in 1977 to arrange for emergency aid for rodent control.

The project was based in Morogoro, the same location as the major agricultural university for Tanzania. Morogoro is also a major agricultural area of Tanzania. The project finally got started with the arrival of Dr. S. R. Telford in June of 1981. In July 1982 the rodent ecologist, Jens Christiansen, arrived. I joined the project in April 1983 to conduct lab and field bait and toxicology testing, develop baiting procedures, train national staff, and set up the extension training program.

Chronic gas supply problems were a problem throughout the life of the project. This limited extended field survey and extension travel. National staff members were also limited and this was a constraint in technology transfer. However, training was carried out by all expatriate staff for the national staff. Training materials were prepared for rodent biology, ecology, and control methods and translated into Swahili.

The major contribution of this project was the large amount of long-term detailed data that was collected over a continuous 4-year period by Dr. S. R. Telford. Over this time period, Dr. Telford collected measurements and reproductive, weight, and seriological data on 13,000 rodents. Ninety percent of them were the multimammate mouse. Most of the samples were collected from around Morogoro from agricultural land as well as fallow and bush areas. The above data were correlated with seasonal as well as crop and rainfall data.

Jens Christiansen has precise data on an additional 3,000 rodents, again, mostly the multimammate mouse. A portion of these rodents were from a trap-and-release quadrant studied over a 2-year period, following the field as it changed from a cornfield to tall grass/bush.

All this information is currently under analysis for publication in the hopefully near future.

During the duration of the project, simple analysis of the data was conducted each month to aid in the design of control methods suitable for the farms and rodents of Tanzania. Control methods were developed and tested that were effective, based on the above information. But the major problem was trying to find a technique or guidelines to aid in the prediction of rodent irruptions. An indicator was found by Dr. Telford that may prove significant for the multimammate mouse and perhaps other rodents that depend on the annual rain cycles to trigger reproductions.

The multimammate mouse has its breeding triggered off by the forbs and grass growth stimulated by the long rains. Breeding is at a high level towards the end of the long rains and for a time after. Many females have more than one litter. But the crops are near harvest at this time and are seldom subjected to damage in the field. At the village level after harvest, the multimammate mouse will invade huts and storage structures during years of unusual abundance. They are very annoying and cause some damage.

Breeding stops by August and populations stay high till December when they crash. The critical time for rat damage is when rodent populations are high enough to dig up and consume sprouting corn seeds. This is why farmers seldom plant for the short rains in November; rodent numbers are high and hungry, and rainfall at that time is totally unreliable. But at times the short rains do bring enough moisture to trigger plant growth. This may trigger an unseasonal breeding period in rodents. The only way to determine this is to trap and take rodent samples for breeding condition observations. Later on you will catch young rats. This condition will allow greater survival plus greater numbers when planting starts for the long rains. Damage at this time can be serious. And if numbers are high enough, serious damage may result to newly planted fields. They may have to be replanted several times, perhaps missing the growing season. A possible tool for prediction for Tanzanian conditions is to try in January and February to check breeding conditions prevailing in the rodent populations. However, trained, mobile national staff must be available to do this work.

At the end of the DANIDA project in June 1985, the methods were available but few trained national staff remained. The Government of Tanzania would like to see this project continued; they realize more rodent control officers are needed.

In contrast, the other rodent control project in Tanzania left behind a large cadre of trained rodent control personnel. The West German Government has for some years sponsored and supported the Tanga Integrated Rural Development Project, TIRDEP. This project is located in the Tanga region of North Western Tanzania. GTZ is the agency conducting this project. One section of TIRDEP was a Rodent Control Extension Training Project, headed by Dieter Schnepper.

This program emphasized extension training of all levels of regional agricultural officials and farmers. This was carried to every major village in the Tanga region. This project stressed training and had no research component. As it developed the cooperation between these two projects resulted in the DANIDA project doing the research and answering technical questions, and the GTZ project supplying emergency supplies of rodenticides and extension training materials to the DANIDA project.

The GTZ project provided a stipend for each participant and made rodenticides and rat traps available at cost in the village stores. In this way trained people had supplies at hand. At the end of this project in July 1985, 9,000 people had been trained in rodent control techniques. I was retained by GTZ to conduct the evaluation of this project. I consider it to be an excellent model for similar projects in developing nations.

The Government of Belgium has initiated a Rodent Research Project in Morogoro, Tanzania. It will work with the Veterinary Department of the Sokoine Agricultural University. It will concentrate on possible diseases that may be transmitted to domestic stock by native rodents. They plan to add to the information gathered by Dr. Telford as well as make an extensive taxonomic rodent collection.

Rodent problems are common to all the remaining East African nations. To this end FAO retained Lynwood Fiedler to make a rodent control survey of five East African nations (Fiedler 1985). In general, few of these nations have rodent control sections in their ministries of agriculture. Generally such duties are attached to the department that could be termed responsible for plant protection.

Little information is available about rodent problems in Mozambique. This is partly due to the chaotic conditions that have prevailed there in the past. This information was gleaned from a conversation with an agricultural official from there. He was very interested in any outside help and information on the subject.

Malawi is one of two East African nations that exports food. In conversations with Tanzanian professors who had duties there, little concern seems to be paid to rodent problems; perhaps they have a lack of information on their problems.

Uganda has no recognizable form of rodent control in any government department at this time. This is due to the chaotic economic and social conditions that have prevailed there. Again, this is from an agricultural professor from Tanzania who worked there. There were vermin control projects there during colonial times.

Zimbabwe is aware of its rodent crop problems but they do not seem to be severe. There are no government officers directly responsible for rodent control activities; it is added on as conditions warrant. Zimbabwe exports food to other African nations, so their food conditions are not critical at this time. There are still large private farms in Zimbabwe.

In summary, East Africa has recurrent rodent problems that exacerbate the already serious food shortages that presently exist there. Foreign aid organizations like FAO, GTZ, USAID and DANIDA have sponsored rodent control programs. But more aid is needed. One positive step has been that all of these organizations have seen the need for education of responsible national staff so they can train their fellow workers and carry on the necessary planning and research. All have sent people overseas for pertinent education. This is a step in the right direction but long-term support is needed. A coordinated approach is possibly the best answer since this would conserve resources and avoid needless duplication. FAO is the logical agency for this, and under Dr. All Farah of FAO, such a program has been envisioned. It would include birds, other mammals, and major migratory insect pests. Few East African nations can afford to have plant protection officers who only do one job.

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