RODENT PESTS IN COLOMBIAN AGRICULTURE

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ABSTRACT: The tropical zones of Latin America are sources of a great faunal richness. A significant number of mammals are associated with damage to the agricultural and livestock industries of Colombia. Some studies have indicated that rodents cause serious economic and social damage in the agricultural, livestock, and stored product sectors of the Colombian economy. Evaluations of this damage have been based on three criteria: 1) the characteristics of the damage; 2) the species of rodent involved; and 3) the loss of production at harvest. Cereals and oil-producing crops are most affected as standing crops; in the livestock area, poultry and pork production are most affected; many agricultural products, especially grains, are attacked by rodents during the post-harvest stage. The level of economic loss caused by rodents can range from about 4% to about 50% depending on the crop, the season, and the species of rodent involved in the damage. Social damages are characterized by the transmission of illnesses such as salmonellosis and leptospirosis via contaminated foods or grains. Six species of rodents of the families Cricetidae and Muridae are most commonly associated with these problems in Colombia.

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INTRODUCTION

The tropical belt of Latin America has a significant number of birds and mammals, and some are associated with the agricultural and livestock industries of the Latin American countries (Elias and Valencia 1984).

In Colombia, mammals represent a heterogenous group among which rodents stand out. Colombia has been one of the countries most affected by damage caused by rodent pests in South America. Damage by rodents in Colombia is often accepted as part of the normal scheme of things in agriculture. It is considered as unavoidable, and prior to the establishment of the Vertebrate Pest Project in ICA, there were few attempts made to evaluate damage, identify species, or attempt to control them (Elias and Valencia 1984). The increase of some rodent populations has been, in many cases, a limiting factor for introduction or development of some crops (Valencia 1985).

Rodents in Colombia are now considered important pests from both the social and the economic points of view (Valencia and Ortiz 1981). Most of the work related to rodent pest problems in Colombia has been done by the Colombian Agricultural Institute (ICA), and by biologists from the Denver Wildlife Research Center (DWRC) in an integrated project sponsored by the U.S. Agency for International Development (USAID). This paper compiles information about the most important rodent pest problems which are of economic and social significance to Colombian agriculture.

RODENT PESTS AND CHARACTERISTICS OF THE DAMAGE

Economic damage by rodents in Colombia involves cereals and oil-producing crops as standing crops. In the livestock area, poultry and pork production are most affected. Agricultural products such as grains and vegetables are attacked by rodents during the post-harvest stage. Social damages are characterized by the transmission of illnesses via contaminated foods or grains.

Six species of rodents are most commonly involved and associated with the economic and social problems in Colombia. These species belong to the families Cricetidae and Muridae. Figure 1 shows the Colombian agricultural areas affected by these rodents. The evaluations of damage caused by rodents in Colombian agriculture have been based on three criteria. These are: 1) the specific characteristics of the damage; 2) the species of rodents involved in the damage; and 3) the loss of production at harvest.

THE MARSH RAT (*Holochilus brasiliensis*); FAMILY CRICETIDAE

The water rat or marsh rat extends throughout South America. In Colombia they have been found in ricefields in the Eastern Plains (Valencia 1987) (Figure 1). The most conspicuous external characteristics of the water rat are the webbed hind toes which facilitate swimming (Valencia 1985). The marsh rat has been observed building nests in areas adjacent to rice crops using residual post-harvest rice material (straw). They also have been seen building their nests directly in the rice plants using leaves and stems of rice plants. The marsh rat has been found in the ricefields, a good habitat for its reproduction and development, and has been considered the most dangerous species causing damage to ricefields in Colombia (Valencia 1987).

Marsh rat damage in ricefields is generally distinguished by the presence of gnawed or cut tillers and pieces of leaves and stems left on the ground or water surface. Marsh rats cut the stems at 10 or 15 centimeters above the ground, making an oblique or inclined cut which identifies the rodent damage in the rice plant (Valencia 1987).

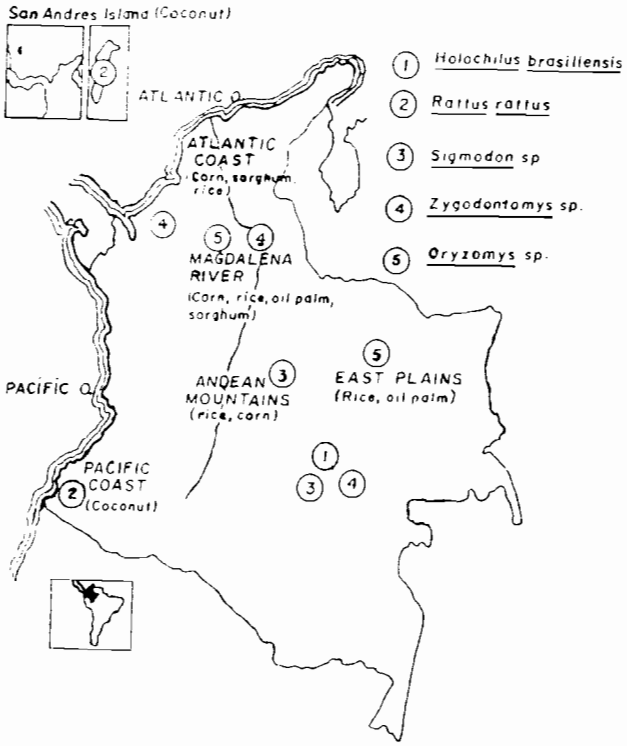

Figure 1. Agricultural areas affected by rodents in Colombia.

Damage assessment of rodents in ricefields in Colombia has been made taking 10 samples at random of one square meter of rice plants and recording the number of rice plants damaged by rodents. Other assessments in ricefields have been obtained from the loss of production at harvest, once the rodent damage has been identified. Damage surveys of marsh rat in ricefields areas of Colombia has been recorded from 4% up to 21% (Valencia 1991).

THE BLACK RAT (*Rattus rattus*); FAMILY MURIDAE

The black rat or roof rat is one of the most known rodents worldwide, and in Colombia this rat has been considered as an important pest from both the social as well as the economic points of view.

The black rat causes severe damage in the coconut-producing areas of Colombia. Black rats damage coconuts by gnawing the husks and soft inner shells of immature nuts. Once the inner shell is penetrated the nut will not develop further; it will soon drop from the tree and is unsuitable for any commercial purpose (Elias and Valencia 1973). The black rat damage evaluations in Colombia consist of selecting, at random, a 100-palm sample, and counting the damaged nuts accumulated during three consecutive weeks. The total number of damaged nuts during this period is multiplied by 17/100 to obtain the number of nuts damaged per palm per year. The percent of damage depends upon the average production of the particular variety and plantation involved (Elias and Valencia 1973, Valencia 1980). Damage surveys in several coconut-producing areas revealed a high percentage of crop loss ranging from 20% in the Pacific Coast up to 34% or higher on San Andres Island in the Atlantic (Valencia 1987) (Figure 1).

The black rat is also involved in damage to stored products. Studies conducted by ICA indicated that 4.5% of stored grains were destroyed by the black rat (Valencia 1991). Evaluation of black rat damage in stored products has been based on the amount of food or grain destroyed or spoiled in relation to the total stored product. The presence of the black rat in warehouses is also associated with the transmission of salmonellosis to the poultry industry in different affected areas.

THE NORWAY RAT (*Rattus norvegicus*); FAMILY MURIDAE

The norway rat, the most common urban rodent in Colombia, also occurs in livestock industries such as poultry and swine. Salmonellosis and leptospirosis are the two diseases most commonly associated with the presence of the norway rat in the mentioned livestock industries of Colombia. Some field and laboratory studies carried out by ICA in the most important poultry-producing areas of Colombia have indicated that 12% of the poultry farms have been contaminated by the bacteria *Salmonella enteritidis* transmitted by the Norway rat. The Norway rat has also been implicated in the transmission of the bacteria *Leptospira* sp. via contaminated foods which has resulted in abortions in about 10% of the herds of swine in the Cauca Valley of Colombia (Valencia 1991).

THE COTTON RAT (*Sigmodon hispidus*) and THE RICE RAT (*Oryzomys* spp.); FAMILY CRICETIDAE

The range of the cotton rat extends from northern South America into Central America, Mexico, and the Southern United States. In Colombia, this species has been found causing damage in ricefields. Damage by cotton rats and rice rats in ricefields is considered seasonal and is located in some rice-producing areas of Colombia. The characteristics of damage by cotton rats and rice rats are similar to those of marsh rats and are distinguished by the presence of gnawed tillers and pieces of leaves left on the ground. Damage by cotton and rice rats has been evaluated on the basis of the reduction of production at harvest; damage by these species in Colombian ricefields ranges from 4% up to 8% in affected areas.

THE CANE RAT (*Zygodontomys brevicauda*); FAMILY CRICETIDAE

The cane rat extends along tropical America from northern Brazil to Central America. In Colombia, the cane rat has been reported causing damage to oil palm in the Eastern Plains (Llanos Orientales). The characteristic damage caused by the cane rat consists of gnawing at the base of the stem of seedling oil palms, reducing the production per hectare or, in many cases, causing the death of the attacked palms. The palms affected by cane rats must be replaced by new palms, thus increasing the costs of crop production. Damage surveys revealed that 19% of the total palms in an oil palm plantation on the Eastern Plains were affected by damage attributable to the cane rat (Valencia 1987).

The cane rat has also been reported to cause damage in corn and sorghum fields. Corn is attacked by the cane rat during the ripening stage; the animal climbs the stem of the corn plant and attacks the ears of corn. The cane rat also attacks the sorghum plant, causing damage directly to the panicle which is cut by the rodents and consumed on the ground. Some droppings of cane rat may be found around the affected cereal plants which help to identify the species of rodent causing the damage.

The amount of damage by the cane rat in corn and sorghum crops has been evaluated on the basis of the loss of production at harvest. The amounts of damage found have been calculated at 33% in sorghum and 50% in corn (Valencia 1991).

CONCLUSIONS

Colombia is one of the South American countries most affected by extensive losses in agricultural crops due to vertebrate pests and rodents. Rats and mice are important factors affecting crops, reducing the production of food and causing serious economic and social problems. These economic and social damages caused by rodents to Colombian agriculture offer an important justification for the development of programs, scientific investigation, and technology transfer. Such programs may lessen or eradicate some of the losses caused by these vertebrate pests in Colombia.

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