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RODENTS AS AGRICULTURAL PESTS IN MEXICO—NATIONAL RODENT CAMPAIGN

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ABSTRACT: Since 1973, through the Ministry of Agriculture and Water Resources, the Mexican Government has established a general campaign against the most important groups of vertebrate pests, which cause severe damage to growing crops, stored products and mechanical damage to agricultural and irrigation schemes.

To achieve information on this subject, presently the main office of the program is engaged on several activities such as the evaluation of the damage, trapping, species involved, research on population structure (densities and fluctuations to prevent sudden increase of rodent population), sex proportion, pregnancy (number of embryos), bait formulation, distribution methods, etc. Sigmodon spp., Oryzomys spp., Peromyscus sp., Rattus spp., Mus sp., Microtus spp. and several members of the Geomyidae have been found to be of a great importance under field conditions.

In Mexico as in many countries and regions of the world, agricultural practices have been a cause of direct or indirect damage to the biological animal or vegetative communities. As soon as the tropical or subtropical forest is destroyed to convert such areas into agricultural lands to be sown--later, ecological equilibrium is lost. Agricultural patterns without a complete scheme to protect soil from erosion and vegetative conservation tend to destroy the ecosystem; small vertebrates such as members of Lagomorpha and Rodentia groups, which were originally in check, become agricultural pests as soon as a new crop has been established.

All the geographical territory of Mexico is a suitable area for rodent dispersion; some of them in very special areas cause trouble as a potential threat to agriculture and animal husbandry installations, such as la Cienaga de Chapala, on the right and left banks of the Lerma river in the states of Guanajuato, Jalisco and Michoacan, la Laguna in Coahuila, the fertile coastal planes of Sinaloa and Veracruz, in a great number of non-irrigated lands, in the High Plateau, as well as in many other agricultural areas of Mexico.

Once in a while an outbreak in a rodent population arises and causes severe damage to agricultural crops. We have information regarding the importance of rats at la Cienaga de Chapala since 1940, destroying maize, wheat, chick peas, sorghum, strawberries, chile and many other basic economical crops in the region.

Since 1973 the Mexican Government through the Ministry of Agriculture and Water Resources has established a Program for Rodent Control in the agricultural areas of Mexico, as one of the activities of the Plant Protection Directory. For the common benefit, the agricultural activities of the country have been divided into 6 economical areas, on which the Plant Protection Directory has 41 Delegations. On each one there is permanent fixed personnel attending the rodent campaign. To achieve information on this subject, presently the main office of the program is engaged in several biological activities such as evaluation of trapping, population structure, classification, densities and fluctuations to prevent sudden increase of rodent populations, sex proportion, pregnancy (number of embryos), damage caused to agricultural crops, rodenticides and bait formulations, field distribution (in bulk, bags and torpedos, etc.), predator and fauna conservation, etc.

In terms of the families and genera that belong to the Order LAGOMORPHA that have been captured and cause great damage to agriculture, irrigation schemes, animal husbandry, and forestation activities in Mexico, we mention the following: Leporidae: Lepus californicus and L. alleni in the semidesert region of the Northern part of Mexico, which damage grass covers by eating their seeds and the dung pellets may carry seeds of bush like mezquite or other type of non-desired vegetation on grass grown lands; and Sylviiagus fioridanus in the plains attacking cereals, legumes and sugarcane plantations. Among the Sciuridae we captured Spermophiius mexicanus mexicanus in melon and water melon plantations. Among the RODENTIA, we found the most serious and destructive pests under field conditions. In the Geomyidae, we found members of the genera Pappogeomys, Heterogeomys and Cratogeomys which attack and destroy vegetables and other crops, orchards and new forest plantations. They also cause damage to garden schemes, roads and constructions in the heights of the Mexico Valley.

We can point out that Cricetidae is the family which comprises several genera of great importance from the agricultural standpoint: Sigmodon hispidus, with more than ten subspecies, Peromyscus, Reithrodontomys, Oryzomys and Microtus. The principal genera of the Muridae, Rattus norvegicus, Rattus rattus and Mus musculus, cause severe damage to farmers, animal husbandry activities and stored materials in the marginal inter urban-rural areas near the populated areas of Mexico.

Plant producers are organized by the Plant Protection Delegations. They furnish grains and other materials such as oil, atractans, flavors, rodenticides, handiwork, etc. The Mexican Government gives technical assistance and about 20% of the rodenticide that is used. There is also economical help received from each state in which the campaign is underway.

The personnel and staff of the program is actually formed of 66 agronomists, a biologist, and 87 technicians. The 1978 budget is on the order of 2.35 million US dollars.

TECHNICAL ASSISTANCE IN HECTAREAS (Up to January 1978)

Period	Indirect	Direct With/Rodenticides	Without Rodenticides	Infested Area	Treated	Trapping
1974-1975	-	761,534	-	-	-	-
1975-1976	1'433,010	1'268,757	24,231	613,853	1'268,757	-
1976-1977	2'403,295	2'350,220	386,635	1'936,385	2'392,295	42,075
1977-1978	1'704,114	1'162,581	395,854	2'599,917	1'432,855	27,614

The rodenticide formulations which are used in the growing agricultural areas of Mexico are mainly two: One is based on 2% $Zn_3 P_2$, as acute or single formulation, and the other with 0.05% of Warfarin, as a cumulative anticoagulant formulation. Actually endrin is forbidden. Nevertheless, it is a very good rodenticide but is not used anymore due to its depredatory effect upon many wild predators of mice and rats in the field. Coumachlor, diphacinone, diphenacoum, Vacor, etc. are investigated, because they have been used only against Rattus spp., but none of them have been tried against members of Cricetidae or other wild rats. The price of technical products are very important for the campaign purposes.

Since a problem of safeguarding commodity supplies clearly exists, the determination of rodent damage to growing crop and farm and village storage products in tropical and subtropical regions of Mexico is of a great importance, in particular with basic and industrial crops such as corn, rice, cotton, sugarcane, coconut and other oil producer crops, and in the temperature zones wheat, barley, beans, horticultural crops, forage and grasses, orchards, forest, etc. The importance of rodents as spreaders of diseases of man and domestic animals is also a point in which the technical personnel of the campaign is engaged, by means of studying captured material in the laboratory where external and internal parasites are checked and preserved and the site of capture is identified for further studies.

Erysipelothrix rhusiopathiae was isolated from a diseased rat captured in Sinaloa. Biochemical tests were made for identification of the pathogen. The organism was preserved through continue passages in mice, actually it is kept in agar blood plates and BHI medium. Further tests to check its inoculability to man and domestic animals will be undertaken.

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