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RODENT BIOLOGY AND CONTROL
(with Special Reference to the Philippines)

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CHAPTER 1

INTRODUCTION

F. F. Sanchez and E. A. Benigno

Rodents are interesting subjects for studies in social behavior, medical research, pest control, religion and politics. They can either be man's best friends or worst enemies. Consider the many contrasting roles that rodents play in our daily lives. The laboratory mouse and the albino rat help researchers make scientific breakthroughs for the benefit of mankind. The beaver, muskrat, nutria and chincilla are valuable fur animals. The field rat is a source of animal protein to many people in rural areas in many countries of Asia. A trained rat or mouse is a prisoner's faithful friend and servant, by performing tricks as well as stealing cigarettes for the master. Because of their keen sense of smell, trained rats can also be used to detect smuggling of narcotics and prohibited drugs in ports.

Rats are worshipped in some cultures and religions. A 500 year-old legend in India holds that souls of dead members of one Rajput clan, the charans, inhabit the bodies of rats until they are reincarnated in human form.

To many, rodents are referred to as biblical scourge. The black rat carried the bubonic plague, better known as the Black Death, which killed



The laboratory rat has been man's favorite subject for research in medicine and other fields.

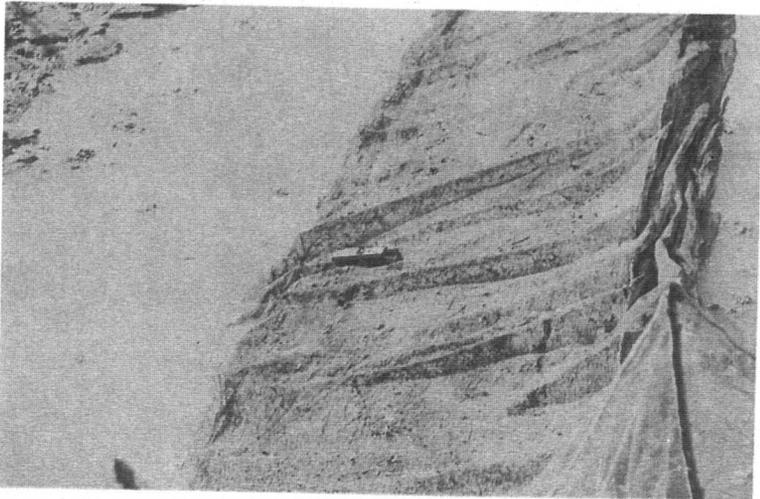
an estimated 43 million people over a five-year period at the end of the 14th century. The threat of plague is still around today. According to 1976 WHO report plague struck 741 people, killing 85 of them.

Less dramatic but economically depressing are the destructive activities of rodents in the farms, food storage, and homes. It is estimated that one-fifth of the worlds produce are consumed or destroyed by rodents. Direct damage to property can be great; expensive machinery can be damaged by rodent and some fires are traced to rodent's gnawing of electrical wires.

Rats can be a political issue too. Local governments, national agencies, international organizations, and the military get involved in massive rat control operations especially during rodent outbreaks. It is not surprising to read contradicting reports. For instance a newspaper reported "RATS; 11 Occidental Mindoro towns infested; rice fields threatened" (Bulletin Today, September 13, 1979) only to be followed later by another report in the same newspaper "No rat infestation in Occidental Mindoro" (Bulletin Today, September 18, 1979). The fact is, reports of rat problems can be easily exaggerated to get people's attention or more money for field operations or research. Farmers may also report more than actual rodent damage in order to collect crop insurance or to justify delay in loan payments.

Rodents as Pests

Rodents pose a real problem and challenge to Philippine agriculture. The outbreaks that periodically occurred in the past have brought incalculable miseries in terms of food shortages and loss of livelihood among our farmers. Today, we still suffer localized staggering losses caused by rodents to rice, corn and many other important crops. The sad thing is that losses can occur at all stages of crop production and storage.



Damage by rodents can start as early as the seedbed. This is a rice seedbed covered with net and set with snap traps — a farmer's way of protecting it from rodents.

Rodents inflict extensive damage to rice in its various stages of growth especially at grain-bearing. At the conservative estimate of 2 to 5 percent damage (Table 1-1), the Philippines' annual rice loss to rats of 2 1/2 to 6 million cavans (50 kg/cavan) of palay is valued at about ₱150 to ₱360 M.

Table 1-1. Estimated percent of mature rice tillers cut by rats in the Philippines during 1970-1972* (Sanchez, et al. 1973).

Province	1970	1971		1972	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season
Albay	—	1.48	1.84	1.94	—
Bohol	—	0.17	—	0.26	—
Bulacan	3.71	—	1.98	—	—
Camarines Sur	2.75	1.09	0.86	0.39	—
Cotabato	8.08	2.88	3.41	2.95	1.97
Iloilo	2.64	3.09	0.41	13.63	0.21
Isabela	1.23	—	—	—	—
Mindoro Or.	4.30	2.14	0.77	—	—
Negros Occ.	0.72	—	1.05	—	0.34
Nueva Ecija	2.68	—	2.53	—	0.54
Pampanga	9.49	—	3.31	—	—
Pangasinan	7.58	—	9.47	—	4.77
National Average	4.53	1.65	3.22	4.31	2.47

*Weighted provincial estimates based on hectareage of planted lowland rice at each season as reported by the National Food and Agricultural Council.

Although no national field damage estimates are available for corn, farmers have complained of severe losses due to rats particularly in fields



Extensive rat damage to rice occurs especially at grain-bearing stage.

adjacent to uncultivated areas. Rats feed on germinating seeds and on developing and maturing corn ears. Partially damaged ears are exposed to secondary damage caused by bacterial and fungal invasion.

Sugarcane, an important export crop is susceptible to heavy rat damage. A survey of Victorias milling district in 1974-75 showed that 16 percent of all canes milled had rat damage resulting in an estimated loss of 132,000 piculs worth more than ₱13 M for the entire district. Applying the gross loss estimates in the survey of 1975 (Table 1-2) on the value of production by regions, total losses for the entire country would approach ₱480 M.

Table 1-2. Damage observed 6-19 November 1975 in representative sugar producing areas (Pank, 1975).

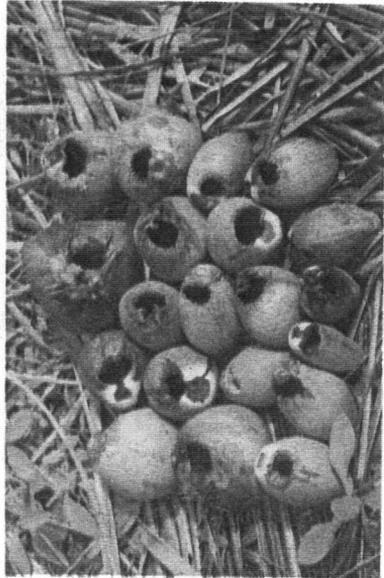
Area	Damage*	Comments
1. Laguna	Negligible to low	Low damage was confined to a few fields with lodging and heavy tonage. One exception was in upright cane adjacent Laguna de Bay (marshy area). Damage confined to ground level.
2. Cavite	Negligible	Limited observations, damage restricted to ground level.
3. Batangas	Negligible	Limited observations, damage restricted to ground level.
4. Davao del Sur	Negligible to high	High damage was observed in cane-coconut interplanting but not predictable. Damage occurred 3-5 feet off ground in fields interspersed with coconut.
5. Occ. Negros	Negligible to high	Victoria area. High damage in fields without control. Damage may be higher because of high tonnage and continuous harvesting. La Granja area had light damage. Damage was generally confined to ground level.
6. Pampanga	Negligible	Limited observations, damage was confined to ground level.
7. Tarlac	Negligible to high	Damage was generally restricted to high yielding varieties with high tonnage and lodging. Potentially associated with wetter areas. Damage was confined to ground level.
8. Pangasinan	Negligible	Low yielding varieties were prevalent. Damage observed was confined to ground level.

*Gross estimates of percent stalks damaged: Negligible = 5%; Low = 5-15%; High = 15%



Severe corn losses due to rats have been reported particularly in fields adjacent to uncultivated areas.

Coconut, another export crop, suffers 14 to 40 percent damaged nuts due to rats. Green, fallen nuts with gnawed holes through the husk is an evidence of recent rat damage. A conservative annual loss figure for the entire country would approach ₱500 M.



Two export crops, sugarcane (left) and coconut (right), are likewise susceptible to heavy rat damage.

Although national damage estimates on other crops are not available, farmers and field technicians are fully aware of the sizeable losses caused by rats.

Coffee farmers in Northern Luzon experience rat damage between the months of October and December. Damage to coffee trees begins during the flowering period when new growth appears. Branches are cut, stripped or girdled resulting in severe defoliation and reduced berry production.

Cacao plantations are also adversely affected by rat activity. Foilage and fruit pods are damaged.

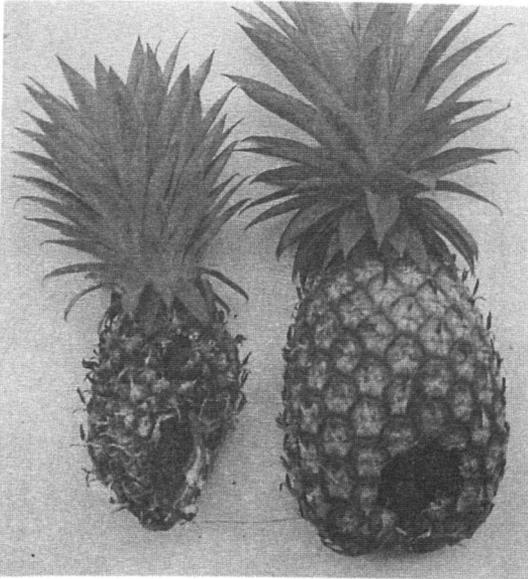
Root crops such as cassava and sweet potato are vulnerable to rodent damage particularly when the tubers start to develop.

Rats inflict damage to pineapple by gnawing its top or crown at early fruiting stage and the succulent flesh of maturing fruits. Damage in the untreated experimental plots has been estimated at 10 percent. If extrapolated to include the total pineapple hectareage this would mean about ₱6 M loss for the pineapple growers.

For cucurbits such as ampalaya, upo, patola and watermelon, farmers in Lumban, Laguna claimed a 30 percent loss to rats in these crops.

Rat damage to papaya, ipil-ipil, vegetables, ornamentals, cotton and other economically important plants have likewise been reported. Altogether, these reports depict a pest that inflicts significant losses to a great majority of agricultural crops in the Philippines.

Rodents can cause extensive damage in warehouses. Stored rice lost due to rodents in modern and conventional warehouses range from 12 to 25 cavans per warehouse annually. This excludes spilled and contaminated stocks that usually accompany feeding by rodents. They also damage the more susceptible parts of the structure by gnawing with their teeth. Aside from being a plant pest, rats are also potential carriers of many human diseases such as plague, murine typhus and leptospirosis.



**Rat Damage to
Fruit Crops**

Pineapple

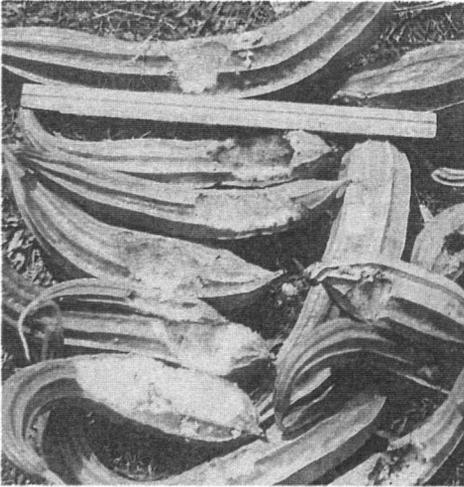


Papaya



Watermelon

Rat Damage to Vegetable Crops



Patola



Squash



Tomato



Mungbean