

RODENTS

AND THEIR MANAGEMENT IN
ANDAMAN AND NICOBAR ISLANDS

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*T*he Andaman and Nicobar Islands is a Union Territory (UT) of India located between 92° - 94° E Longitude and 6-14° N Latitude. The group of islands forms an arched string of 572 Islands and islets in Bay of Bengal stretching from Burma in the north to Sumatra in the south. The climate is unique with humid tropical (temp 28-32°C and RH 75-95%), endowed with the occurrence of both South-West and North-East monsoon and the rainy season is of more than eight months in a year with an average rainfall of 3100mm.

*R*odents are largest group of mammals in Andaman Islands represented by 15 species, although detailed information about these is lacking. The impact of rodents is significant in terms of agriculture through crop and commodity loss and in public health. Reports also exist on damage caused to oil palm in Little Andaman. These islands are known foci for the human disease – Leptospirosis, transmitted by rodent vectors.

AGRICULTURE



The Union Territory of Andaman and Nicobar Islands is divided into two districts namely Andaman and Nicobar and four subdivisions with 7 tehsils and 204 revenue villages (Census villages 547, of which 46 are uninhabited). Total geographical area of the UT is 640800 ha of which total cropped area are only 14949.53 ha. The cropped areas during 2000-03 indicated that coconut farming occupies maximum area (<25000 ha) followed by rice (9800-10885 ha) and banana (1707-1737 ha). Area under other crops is: cashew nut (800 ha), rabi pulses (420-1280 ha), tapioca (200-540 ha) papaya (170 ha), sugarcane (80-160 ha) and sweet potato (39-1200 ha). Rodents are major pests in rice, coconuts, oil palm, storage and household situations.

➤ Coconut

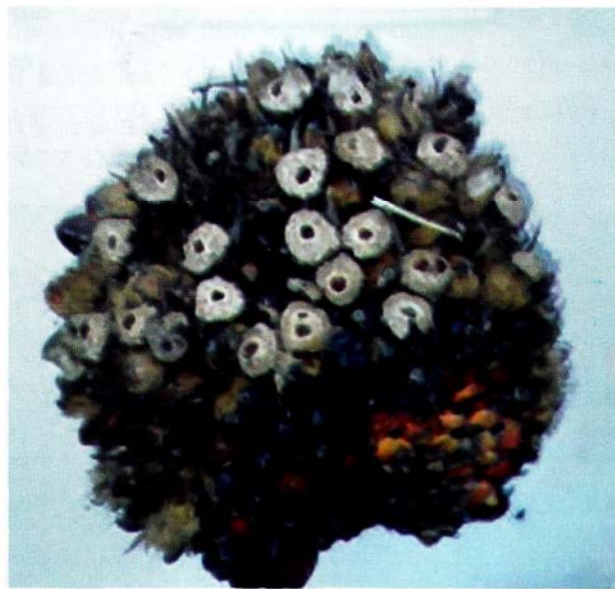
The soils are sandy loam to silt loam favoring coconut cultivation. Productivity of coconut is very low (15 - 30nuts/ palm/ year), although the crop gives lot of economic returns as well as man days for many residents, because of various reasons including rodent damage. Most of the palms are grown under natural farming. The data collected in South Andaman district indicated that 8 to 26 percent of coconut palms are infested



with rodents. Looking at the economic angle, such infestation rate directly affects the returns for the farmers. Typically rat damage to coconuts consists of a single hole of approximately 65 x 40 mm usually found near the nut's point of attachment. As rats are unable to penetrate mature or nearly mature coconuts, damage takes place in the palm crown. The rat after gnawing the husk consumes the inner contents including the soft-shell of the nut. After gnawing the husk, they consume the inner contents. The damaged nut may fall on the ground in 2-6 days or even up to 15-20 days of rodent attack.

➤ Oil palm

Rodents damage oil palm at seedling, female flowering stages and its immature and mature fruits. A study conducted in Little Andaman indicated rodent activity on all palms frequenting from adjoining forest area or from the nests made on the fronds. Around 40% of damage to seedlings, 29.5% to young palms and 57% to mature palms has been reported during 1980s. The total area under oil palm plantation is 1593ha. An extensive survey in two different locations of Little Andaman was carried out to assess the rodent infestation in oil palm cropping system. The palms infested ranged from 40 to 50 percent indicating the intensity of their problem.



PUBLIC HEALTH



The Andaman and Nicobar Islands were known to be endemic for leptospirosis, a febrile human disease, during the early part of the century. Later, for about six decades no information about the status of the disease in these islands was available. During late 1980s leptospirosis reappeared among the settler population and several outbreaks have been reported since then with high case fatality rates. Whilst there are no official incidence rates for most Indian provinces, published data is available for Andaman islands, one of the most endemic areas of the world with a documented incidence rate of 50/100,000. The islands receive a high annual rainfall of more than 3000 mm and the relative humidity ranges between 70 and 90% throughout the year. About 86% of the land area is covered with tropical rain forest. Further, rice is the main food crop grown in this territory and the cultivating techniques remain conventional with very little mechanization. All these factors make the environment of these islands ideal for the successful transmission of leptospirosis.

RODENT PEST SPECIES

Order Rodentia make up almost 40 percent of mammal species and represent the largest order of mammals, comprising around 1,700 species in 35 families that include 389 genera throughout the world. One pair of '*chisel*' shaped incisors on upper and lower jaws characterizes their definition. The name of the order is derived from the Latin *rodere* meaning '*to grow*'. Their dentition is characterized by a wide gap – the diastema,



formed by the absence of canines and pre-molar teeth. The incisor teeth grow throughout the life and this has led to the gnawing habit in order to curb the growth of incisors. This habit has made them a menace to various edible and inedible commodities. In India, 4 families, 43 genera, and 104 species represent rodents. However, 14 species are of economic importance in the country. As per the available reports, 15 rodent species exist in Andaman Islands and species belonging to genera *Rattus*, *Mus* and *Funambulus* are associated with crop losses in plantation crops such as oil palms, coconuts and cocoa etc

➤ The Rats

These are the most predominant animals under Family Muridae and sub family Murinae. Rodents known to inhabit the Andaman and Nicobar islands include 13 species of rats, including 5 species of house rats, as per the information with Environment and Forest Department. The House rat species include *Rattus rattus alexandrinus*, *Rattus rattus andamanensis*, *Rattus rattus atridorsum*, *Rattus rattus flebilis* and *Rattus rattus holchu*. Other *Rattus* species include *Rattus burrescens*, *Rattus burrulus*, *Rattus burrus*, *Rattus palmarum*, *Rattus pulliventer*, *Rattus rogersi*, *Rattus stoicus* and *Rattus taciturnus*. Information on their pest status does not exist.



The House Rat (*Rattus rattus*)

Characteristics	Habits	Habitat	Pest status
In general, house rats are medium sized (80-120 g) rodents with bicolor and ringed tail that is longer than head and body length. They breed throughout the year producing 5 to 7 litters a year. Gestation period is 22 days with a litter size of 6-14 young ones. The intensity of breeding is lower during summer months.	They are generally nocturnal and are good climbers with longer tail to balance. Hence they prefer to live on roofs of residential areas. On the crowns of coconut, the rats construct nests either in the inter spaces of nuts or inside stipules in the spindle of the palm. In coconut palms, they move from one palm to other through interwoven fronds and seldom come to ground for foraging.	They are common in residential premises and also on coconut plantations. They are active climbers and 82% of its activity is confined to the trees canopy. They live on trees constructing nests. On coconut, it lives in interspaces of nuts or inside stipules in the spindle portion.	Much information does not exist. However, some of them are pests in coconut, storage and household situations.

➤ Mice & House Mouse (*Mus musculus castaneus*)

Among all rodents mice are smaller animals with more resilience and reproductively making them not only as pests, but also as nuisance animals causing damage to non-edible articles



due to their nibbling behavior. Reproduction activity in *Mus* species is characterized by rapid sexual maturation, short gestation period, and post partum oestrus, breeding throughout the year. Only one species, *Mus musculus castaneus* of mice is present in these Islands.

Characteristics	Habits	Habitat	Pest status
It is very small rodent of approximately of 15g with bicolour tail longer than head and body. The dorsal side is dark brown to sandy in colour. Breed throughout the year with a litter size of 1-8 (Mean 5.6) young ones, oestrous period of 5.7 days, and gestation period of 18 days. Young ones reach maturity in 45 days. Annual productivity is 31 young ones per female.	It is nocturnal, fussorial and highly active. Due to its nibbling habit, it makes damage to sacks and feeds on great variety of foods.	Primarily inhabits indoors i.e. houses, backyard, gardens, godowns and grains commodities.	It is serious pest in residential premises and coconut. It is vector for Leptospirosis. In addition to feeding the stored grains, they also damage the containers and thus lead to colossal losses.

➤ Squirrels

All the Squirrels under Family Sciuridae are characterized by their bushy tail. Among the tree squirrels, represented by 5 genera and 15 species in India, only one species, Northern palm squirrel / five -striped squirrel, *Funambulus pennanti* is of economic importance in Andamans. It is an introduced species having transported from main land.



Northern palm squirrel (*Funambulus pennanti*)

Morphological characters	Habits	Habitat	Pest status
It is a medium sized rodent (90-110g) with bushy tail equal to head and body length. The dorsal surface has three distinct white stripes at the dorsum and two light white stripes on sides and hence called as 5-striped squirrel.	It is a diurnal rodent and lives in nests made on trees. It breeds all through the year with a peak during post monsoon months.	Inhabits horticultural/ plantation crops.	It is seen infesting coconut in the Andaman islands.

RODENT MANAGEMENT



There exists a need for managing rodents due to the fact that they not only cause losses to field and plantation crops, commodities in storage and in residential premises, but also vectors for human leptospirosis. The primary aim is to reduce damage to crops and commodities and to reduce the human disease incidence, rather than to kill these animals. In order to achieve this, it is quite essential integrating various management measures to bring out effective control of the situation.

➤ Environmental Manipulation

Weeds and crop refuge provide shelter to rodents, therefore removal of weeds and other refuges and maintenance of cleanliness in and around plantation orchards and crop fields are recommended. Besides, manual destruction of squirrel and rat nests made on the trees should be done at regular intervals to discourage rodents to establish in the orchards.

Trapping

Trapping is one of the oldest methods of animal control. A variety of traps is used against rodents - live or kills. The efficacy of trapping, whether live or snap trap, depends on operational conditions of the trap, number of traps set, type of bait, place and time of placement. Scientific literature has seldom proved trapping as effective measure of reducing rodent numbers. However, they can help in maintaining rodent numbers at a low level once they have been reduced by other methods. Besides it is also useful in assessing the rodent species composition and its population density in different habitats.

Ultrasound and Electromagnetic Devices

The sense of hearing among rodents is above 20 kHz thus extending well into ultrasonic range. Ultrasound devices can be used as deterrents to rodent immigration into the buildings/structures. However, no convincing evidence was found them to be as effective on long term.

Chemical Repellents

There is no effective chemical repellent available that is not also toxic. Currently a castor based natural product is under evaluation for testing its efficacy of repelling rodents from the crop fields and domestic premises. Although pheromones appear to be promising, lot of scientific work is required to identify, isolate and bring out the pheromones for extension purpose.

Use of Rodenticides

Rodenticides remain as major measure to bring down the rodent population at desirable levels. Generally campaign based approach of using rodenticides gives desirable success. Rodent vector control is primary method of preventing human leptospirosis. For this also rodenticidal baiting remains the most effective tool. Right choice of rodenticide based on the ground situation is needed. Whenever, rodent populations are at higher side, acute rodenticide like zinc phosphide can be considered. At moderate level of populations, anticoagulant (bromadiolone) bait applications deliver effective results and also minimizes likely problems of secondary/accidental toxicities to non target animals. After a field study in Andaman Islands, bromadiolone was reported to be effective in controlling these pests. Recent rodent control campaigns conducted during July-August, 2009 in four southern districts of Gujarat using the bromadiolone baiting in sugarcane crop fields have reduced not only the rodent damage to an extent of about 15% damage to

sugarcane, but also reduced the incidence of human leptospirosis by about 60% in these districts. In view of this, large scale community level anti rodent campaigns are likely to bring down the incidence of human leptospirosis in these Islands.



It is essential to note that application of rodenticides and environmental manipulation should be considered as complimentary to each other rather than alternative approaches.

APPLICATION TECHNIQUES

The chemical control of rodent infestation is most commonly accomplished by the use of poisoned baits. Hence, selection of acceptable baits and their placement is an important element in a successful rodent control.

- ▶ Bait materials most commonly used for management of rodents are crushed cereals. Cereals bait have been found in widest use because rodents generally prefer them; they can be most easily mixed with poisons; and because of their low moisture content they also tend to keep well, both in the storage and in the field conditions. For Andaman Islands, broken rice could be used as bait base material.

- ▶ Dosages recommended in baits for zinc phosphide is 2.0% and for bromadiolone is 0.005%.
- ▶ For preparing one kg of bromadiolone (0.005%) bait, 960g crushed cereal, 20g edible oil and 20 g bromadiolone CB powder (0.25%) are recommended. For zinc phosphide bait also similar quantity of cereal, oil and toxicant is required. First of all the oil is to be smeared on the cereal grains and then rodenticide powder is sprinkled and mixed thoroughly so that poison is uniformly distributed on oil smeared grains. Bromadiolone RB could be used on coconut to control rodent pests at 30 g placed on the crown of these trees.
- ▶ The baits should be laid in the late evening, since rodents are mostly nocturnal. Open baiting i.e. placing the baits in open places should not be resorted. Instead protected bait containers may be used on the runways of rodents. Zinc phosphide baiting should be avoided in residential premises.
- ▶ The position of bait containers should not be changed. While using bromadiolone small quantities of the poison bait (10-20 g.) should be laid at all the places frequented by the rodents. The application may be repeated on 8th day to tackle residual population.
- ▶ Keep poison away from the reach of children, pet animals, drugs and food. Smoking, eating and drinking should be totally avoided while handling the rodenticides.
- ▶ Containers of the rodenticides should be opened in a well ventilated room. Unused baits, containers and dead rodents should be buried deep.
- ▶ Clean the hands, eyes and nose thoroughly after preparation of baits as well as after distributing the poison baits. Ensure that the antidotes of poisons are available with the doctor for use in case any accidental ingestion of poison.

For sustainable management of rodents, rodenticidal baiting must be undertaken in larger areas in a cooperative manner. Looking to the shortage of trained manpower in rodent management capacity building activities among extension functionaries needs to be strengthened. Similarly, awareness creation measures about these pests/vectors, among the farmers and residents of the islands will bring effective results.



For further details please contact

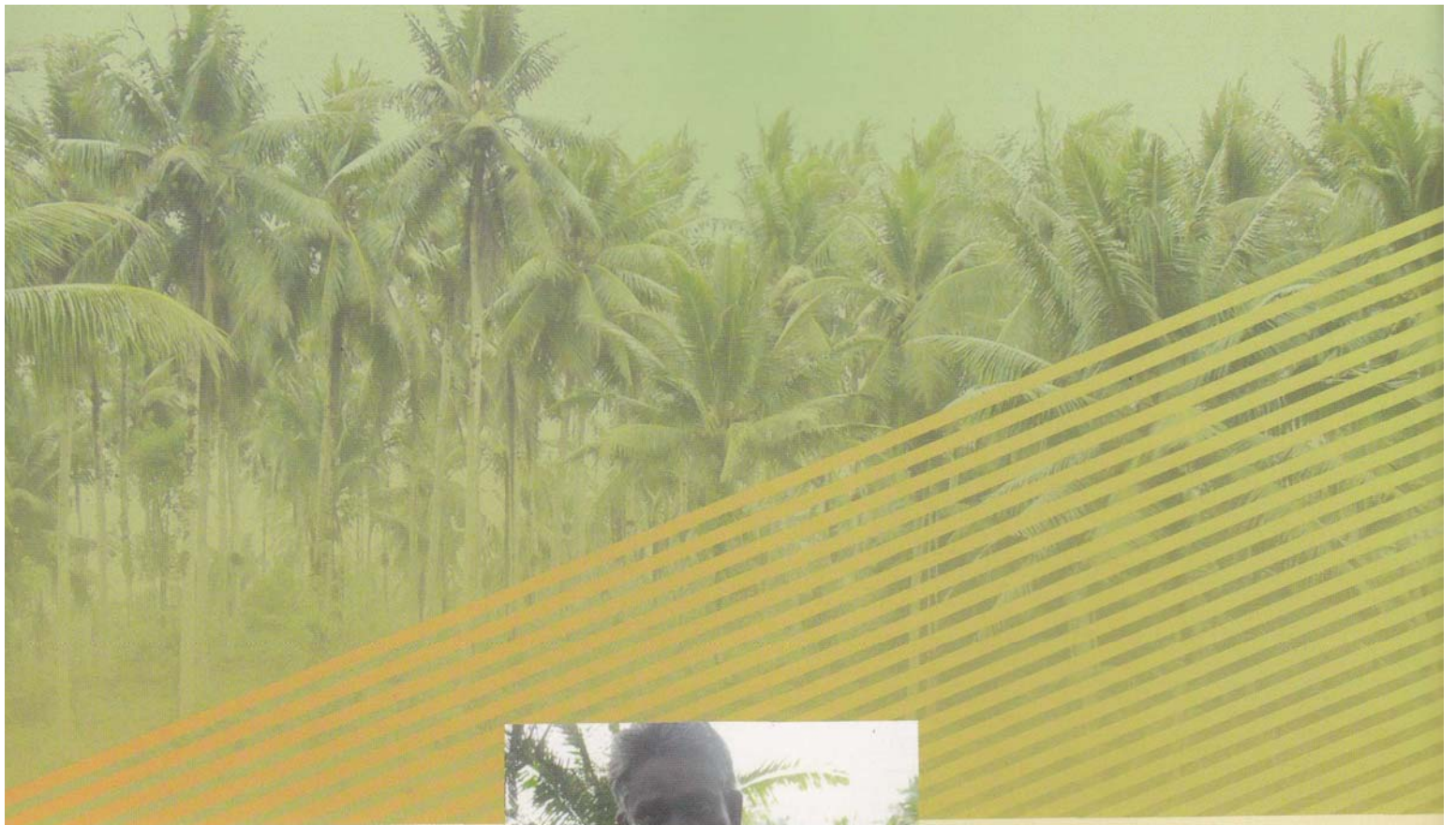
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