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Rodent control in the Lakshadweep islands

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Recently our Field Officer, S. Bhaskar, spent 4 months surveying the marine turtles of the Lakshadweep group. During his trip he made observations and interviewed local authorities on the rat problem. As much as 6 million coconuts worth Rs. 35 lakhs are destroyed by rats on these islands annually. (*Rodent Newsletter*, vol 2, No. 1, page 8) Considering the staggering costs of rat control by conventional pesticide measures (chart 1) and the reportedly very rapid population recovery by the Island rats it is suggested that two biological control measures be investigated for effectiveness and cost economy. The first is the release of a suitable climbing nonvenomous rat-eating

species of snake or monitor lizard (of one sex, initially) on one of the uninhabited islands. All, including ecological and social aspects of this proposal would be worked out in detail. A similar experiment was carried out on Australian islands using pythons to control the rats. Similarly pythons were long the rat killers of the granaries in Singapore and the river sides in Bangkok.

The second control measure is for a team of Irula rat catchers (from the Madras area) to carry out an experimental rat catching programme using their methods for a cost/benefit analysis and stimulate the Islanders to once again organize the annual Rat Hunt.

Rodent Control Programme

Agatli Island, Lakshadweep

1-11-76 to 17-11-76

<i>Material</i>	<i>Cost</i>	<i>Area treated</i>	<i>Rats killed</i>
74,000 Warfarin blocks @ 31 p.	Rs.22,940/-	59,185 coconut trees	482
Aluminium phosphide tablets	?	1057 rat burrows	?
Zinc phosphide baits	?	1119 bait stations in 504 houses	1191
Labour (hunting) 2469 man-days @ Rs.5/-	Rs. 12, 345/-	1115 dwelling places (homes, sheds etc.) hunted	825
Total cost	Rs. 35,285/-	Total Rats killed	2498

*About Rs. 14/- per rat

Ecology and control of *Bandicota bengalensis* (Gray)

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The present studies on ecology and control of *Bandicota bengalensis* were carried out from November, 1976 to February, 1978 at the fields of Punjab Agricultural University, Ludhiana, and those of adjoining villages.

Present investigations reveal that the percentage of various murid species viz., *Mus musculus bactrianus* (Blyth); *Mus booduga* (Gray); *Mus platythrix* (Bennet), *Bandicota bengalensis* (Gray); *Tatera indica* (Hardwicke) and *Golunda ellioti* (Gray); was 39.07, 26.14, 15.53, 0.20, 8.15, 8.88 and 2.00 respectively. Maximum individuals of rodents i. e., 146.43 per hectare were trapped in the month of October.

Both biotic (crop and stages of crop, food and shelter) and abiotic (environmental temperature and rainfall) have marked influence on the relative abundance of the murids. The correlation co-efficient between mean environmental temperature and the murids trapped per hectare was found to be statistically significant except for *G. ellioti*, whereas it was found to be non significant for relative humidity. The

regression of environmental temperature on activity is higher for *B. bengalensis* and least for *G. ellioti*.

Rats and mice were active at maturity stage in sugarcane, wheat and groundnut, and at seedling stage in maize and groundnut.

Most complicated burrow was found in a field after harvesting of wheat crop. In wheat and groundnut crops length, breadth and depth of burrow increased with the age of crop. Maximum length i. e., 1230 cm of burrow was found along pathways.

Using wonder traps for control of rodents, 81 per cent population was encountered during the month of November from a sugarcane field whereas, 73 per cent population was captured in wheat crop during 15 days of trapping from 1 February to 16th. February.

While comparing the efficacy of two rodenticides viz. zinc phosphide and vacor, later was found to be more effective at low concentration (.5, 1%, 1.5%). No significant difference between the two rodenticides has been observed at 2 per cent concentration.

Studies on the bait shyness and poison aversion in *B. bengalensis* using vacor and zinc phosphide as rodenticides have revealed an aver-

sion. Bait shyness developed due to vacor lasting for 7-15 days only and it lasts up to 15-22 days in case of zinc phosphide.

Some observations on the cacao (*Theobroma cacao* L.) feeding behaviour in rodents

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Rodents cause considerable damage to cacao in south India. They usually damage the ripe pods but when ripe pods are not available they attack immature pods also. With the help of their sharp incisors they gnaw a hole on the pod surface. They eat the sweet mucilaginous covering of the beans and the beans are seldom consumed by them. The rodent damaged cacao pods usually remain on the tree for months together and they may in turn act as the nucleus for 'black pod' a disease caused by the fungus *Phytophthora palmivora*.

The rodent damaged cacao pods can be easily identified by the incisor markings on the pod surface. But no information was available to distinguish between the squirrel (*Funambulus spp.*) and rat (*Rattus rattus*) damaged pods. My observations on the cacao feeding behaviour in squirrels and rats, both in field and in laboratory, revealed that the squirrels damage the centre or the terminal portion of the pods, whereas the rats damage the stalk portion. Moreover, the nibbled area in squirrel damaged pods is mostly oval to oblong in shape and in rat damaged pods it is round to triangle.

Laboratory studies on the feeding behaviour of *Mus platythrix*

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By offering *Mus platythrix*, multiple choice of cereals (rice, ragi, jowar, wheat and maize) pulses (green gram, horse gram, cowpea, field beans and groundnuts) and oils (groundnut oil, coconut oil, gingilly oil), food preferences were established. Each grain was offered in three particle sizes (whole, broken and powder) to detect texture preferences. While the mice established a definite preferential order of cereal intake

(ragi > jowar > maize > rice > wheat) their behaviour towards pulses was different. All the pulses were sampled and eaten in more or less equal quantities. The three oils tested were liked at a concentration of 7-10 per cent in the floor as well as in the whole grain. The order of texture was whole grain > broken grain > powder for the cereals and pulses tested except field beans (broken > whole powder).

Laboratory evaluation of Glyzophrol - A chemosterilant

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The introduction of Glyzophrol represents a new method of rodent control which acts by eliminating sexual fertility. Glyzophrol contains butandiol-bismethane sulphonic acid, an active substance which not only causes permanent sexual sterility in rats, namely, brown rat (*Rattus norvegicus*) and black rat (*Rattus rattus*), but also kill them within 8-18 days at higher dosages.

The efficacy of Glyzophrol, an edible chemosterilant bait was tested

in the laboratory against black rat (*Rattus rattus*). A single dose of 30 mg/kg body weight did not show any typical change in the histo-architecture in the testis and ovaries of rats after 4-5 weeks of baiting. However, the histological changes were observed in the testis and ovaries of rat caused by a single dose of 40 mg/kg body weight after two months of baiting. Almost all the seminiferous tubules were severely damaged in the testis.

The basement membrane though intact, sperms, spermatocytes (primary, secondary and tertiary) were degenerated and a few damaged sperms were seen in the lumen.

Some histopathological changes have also been observed in the mature follicles besides degeneration of ovum. Further studies are in progress.

Food Preferences of the Large Bandicoot rat *Bandicota indica*

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Laboratory tests on the feeding behaviour of *B. indica* showed the following preferential order of intake of cereals, pulses and oils: rice > wheat > maize > ragi = jowar; groundnut > green gram > cow gram > field bean; and groundnut oil > gingilly oil > coconut oil. Rice was best liked in cracked

form. Best liked oil concentrations were at 7-10 per cent. Addition of 2 per cent salt/sugar to the bait had no effect on the intake. The selective value of cereals and pulses seemed to be influenced by their nutritive values. In all the tests conducted, a high degree of 'omnivory' was noticed.

Collection of *Rattus rattus* and variants

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Patkar College, Goregaon Bombay 62

Observation on rat collection of *Rattus* species in Goregaon-Malad have shown that this rat predominates in the area to the tune of 78 per cent. There are two species of this rat of which *Rattus rattus rufescens*, forms 80 per cent of the collection and *Rattus rattus wroughtoni* is the other species. However there has been a rat of this type collected in very small numbers showing a white patch on the ventral side in the pelvic or

pectoral region. It differs in the comparative study of the internal morphology of both the above two species. The chromosome studies indicate that it is a polymorphic form of *Rattus rattus rufescens*. A pregnant female collected gave birth to 4 spotted young ones. Cross breeding is not possible as such this form seems to be a variant coming up in the houses. Similar forms have been observed in greater Bombay and Poona too.

Rodent problem in field crops in Daijer village, Jodhpur

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During December, 1975 an ecological evaluation of field rodents in the Operational Research Programme area at Daijer was made. Rodent species composition was represented predominantly by the Soft-furred field rat, *Rattus meliada pallidior*, 81.8 per cent followed by the Spiny field mouse, *Mus platythrrix sadhu*, 9.0 per cent, The Indian gerbil, *Tatera indica indica* and Indian bush rat, *Gomunda ellioti*, 4.0 per cent each.

Rattus meliada and *Tatera indica* caused severe damage to Kharif and Rabi crops during 1975 almost at every stage of their growth which

was about 10 per cent of the total. However, the extent of damage to chilly fruits was estimated to be 26.3 per cent. The average number of fresh fruits destroyed by the rodents was found to be 58/24 hrs.

After surveying active burrows, the rodent control operation was undertaken on a large scale in chilly, potato, carrot and wheat crop fields with two per cent zinc phosphide.

The pre-poisoning trapping (20.18) rodents/100 trap/24 hrs) was reduced to 4.6, suggesting a kill success of 80 per cent.

Three Dimensional approach against Rodent

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A new integrated approach namely "Three dimensional approach against rats" has been devised by the authors with a dual objective of suppressing the rodent population below economic threshold and at the same time to derive economic benefit from their skin byproducts as given below.

Suppression of Rodent population

The integrated rodent pest management system helps not only in suppressing the rodent population but also eradicating them from the treated areas. This system includes an integration of poison baiting, mechanical method and use of

chemosterilants. The integrated Rodent Eradication Programme should be closely knitted with the Integrated Rural Development Programme of the village in which panchayat samitis, youth organisation village schools, health and medical units and other active agencies should work under the leadership of agricultural universities who will be responsible for training, extension and operational activities. To make the movement more effective, the villagers should be encouraged for bringing dead or alive rats on payment basis.

Utilization of rat skins for finished leather manufactures

The pilot scale experiments on the suitability and utilization of tanned leather skins of various species of rats viz., *Bandicota bengalensis bengalensis*, *Nesokia indica*, *Tatera indica* and *Rattus rattus* with the collaboration of Central Leather Research Institute, Kanpur, have been successful in producing durable and high quality leather. Out of various hair-on skins obtained, *Tatera indica* yielded very

attractive, better and lasting quality of leather. Out of these skins, certain fancy articles like ladies bags, money purses, hand gloves, baby shoes, key purses, ladies sandals, spectacle case and even the fur coat and other garments have been prepared with the help of Export Promotion Council for finished Leather Manufactures, Kanpur.

Utilization of by-products as rat meal/fertilizer/manure and dog biscuits, etc.

After flaying rats their whole body could suitably be utilized in the preparation of manures and fertilizers as they are rich in nitrogen, potash, phosphorus and other nutrients required for the luxuriant growth and bumper harvest of the crops. Besides, the rat meat possess high vitaminic and nutritional value that is why it can be used in the preparation of dog biscuits and poultry meal etc. after drying and grinding it. Moreover, the rat meat is also used in the preparation of delicious dishes in the North-Eastern States of the country.

NOTICE

Membership for "Rodentological Society of India" is open to interested research workers in the field of Rodentology. Fees for ordinary membership is Rs. 32/- Rs. 11/- as admission fee and Rs. 21/- as annual subscription. The above society will be publishing the "Indian Journal of Rodentology". For detailed information please contact: Dr. G. C. Chaturvedi, Secretary, Rodentological Society of India, Rodent Centre, Near Bindu Sarovar, Sidhpur-384158, INDIA.

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