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Rat damage and its control in the coconut grove

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In India reports on rat damage to coconut and its control aspect are scanty. Hence, present study was undertaken in the Regional Coconut Research Station, Arsikere, which had severe rat problem, and which instigated the study of species involved, type of damage and its control.

In the nursery of 1/2 hectare active burrows of *Bandicota bengalensis* with characteristic heeps of mud in the form of mole hill were seen. Out of 2000 seedlings in the nursery 136 seedling (6.8% of the total) were damaged. The damaged seedlings died off and were yellow and dried. Uprooting of these seedlings showed absence of roots and had typical gnawed region at the point of seedling coming out of the shell. Stomach analysis and burrow excavated in the paddy fields, revealed the presence of roots, tubers, and subterranian stems of Ginger grass *(Panicum repens)* and weeds. Occurrence of *Bandicota bengalensis* in coconut nurseries and its depredation on roots of seedlings, and cabbage part of transplanted seedlings, suggests the possibility of *Bandicota bengalensis*, getting its dietary requirments in the nursery. Standardized treatment with Zinc phosphide followed by Aluminium phosphide brought about 80% reduction in rodent activity by knocking down the population from 15 active burrows to 2 active burrows.

In two randomly selected sample areas (1/2 hectare each) consisting of 40 tress with one of the sample trunk banded according to Hoque (1973, The Philippine Agriculturist, 56 : 280–289), and other with unbanded trees, present investigation revealed the presence of rat damaged nuts intact and also fallen. Closer inspection showed the presence of faecal dropings on the crown of the trees. Rat damage was observed in nuts of intermediate–I and tender coconut stage with high intensity in the former stage in both sample areas. The cost benefits of banding was assessed taking incidence of rat infested tree and percent damage in each tree of both the sample areas. It showed that trunk banding which is reported to be 100% effective in controlling the rat damage

(Hoque, 1973) does not seem to be realistic. Though incidence of rat infested trees is 7.5% in banded area, whereas 25% in unbanded area, the mean nuts damaged per tree was found to be 22 nuts/ hectare in banded and 14.37 nuts/ hectare in unbanded. Trunk banding without a follow-up treatment with zinc phosphide to take care of population already present on the tree would result in only 54.8% effectiveness. Hence, a follow-up with standardized zinc phosphide treatment is recommended which proved 100% effective in control of the confined infestation.

The phenomenon of poison shyness in *Meriones hurrianae* and *Rattus meltada*

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Both the species, *M. hurrianae* and *R. meltada* develop a severe poison shyness after a single exposure to Zinc phosphide poison baiting. Experiments were carried out to mitigate the phenomenon of poison shyness by changing the marking oils (Arachis oil and Coconut oil) and altering the duration of exposure to sublethal dose of Zinc phosphide. But results indicated that these alterations do not help in overcoming the phenomenon of poison shyness. Experiments however indicated that losses can be reduced by altering the poison.

Rodent odour as a phago-stimulant

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It is known that olfactory preception among rodents is a well developed attribute of their adaptation syndrome. With a view to use this propensity a short experiment was designed and results appear to be apparently fruitful. A male and a female Indian gerbil, *Tatera indica* were released in separate boxes in which bajra was stored. This 'scented' bajra carrying the odour of the rodent, urine and faecal matter was provided to 10 (5 male, 5 female) *Tatera indica* along with simple bajra in separate food containers and the daily intake of both the food items was recorded for 7 days. It is revealed that the 'scented' bajra was consumed (4.60 g/100 g body weight) in significantly ($P < 0.001$) larger quantity than ordinary bajra (1.02 g/100 g body weight). The indication of this preference has given us a tool to enhance the consumption of poisoned food by rodents which will consequently increase the efficiency of control operation. Trials are being carried out in laboratory and in fields on these lines.

Observation on consumption and contamination in wheat and bajra grains by *R. rattus* in cages

G. C. Chaturvedi, M. J. Patel and K. M. Thakore
Rodent Centre, Sidhpur

Experiments were carried out with Bajra and Wheat grains. The whole grains in known quantity were offered every day. The grains remaining unconsumed were collected every day and then separated to find out the quantities of whole and partly eaten grains and also grains with their embryopoints eaten. Results indicate that :

(i) Consumption of bajra is greater than that of wheat.

(ii) Damage is greater in wheat by partial consumption of the grain by eating embryo point, than in Bajra.

(iii) Though female rats eat greater quantity of food, males do more damage by partly eating the grain embryopoints of the grains.

Efficacy of anticoagulant rodenticide warfarin based rodafarin for the control of *Mus musculus*

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It has been observed that house mice to certain extent persist even after the completion of 20 days control operation with warfarin based Rodafarin. Besides other possible reasons like its diurnal and nibbling habits, the effect of chemical was studied.

Mice were collected by trapping and placed in laboratory for aclamatisation. Rodafarin was offered in

crushed bajra at a 0.025 per cent concentration Water was given ad libitum. It was observed that mice take more time to die as indicated by average day of death of 8.05 days in comparison to house rat which die normaly within 5 to 6 days. It was also noted that female mice take more time to die than the male, an observation in contrast to *R. rattus* where females succumb earlier to Rodafarin than males.

Poison-carrier for *Golunda ellioti gujerati* Thomas

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The Bush rat, *Golunda ellioti gujerati*, Thomas is a predominant pest of crops and grasslands in the Indian desert. For the control of this species single and multiple bait preference have been worked out. Moong *(Vigna radiata)* was most preferred by the Bush rats and Jowar *(Sorghum vulgare)* was the next choice. However, in multiple choice experiments, the acceptability rank of moong was lowered and Bajra *(Pennisetum typhoides)* in cracked form was most preferred, followed by roasted and whole jowar. These two grains are easily available with farmers and are grown in plenty in this desert region. The additives like vegetable oils, salt and sugar did not increase the palatability and consumption of various food items.

Rodent control in cyclone affected regions*

It is known that availability of green and nutritive food increases the fertility of animals, particularly the rodents. In cyclone-affected areas, where the habitat has not been altered in totality, and where the crops have been lodged, good quality food would be available in abundance to field rodents. There is, therefore, a possibility of an explosion in their numbers.

Secondly, when a habitat is drastically disturbed, as by the recent cyclone over our eastern coastline, the fertility of the surviving population of rodents is considerably enchanced and an upsurge in their population could be expected under such circumstances. Rodents, particularly the exploratory types, also tend to migrate from the adjoining areas to regions where they have been destroyed by natural calamities. When they establish populations in low numbers in regions where food and shelter are available, they usually reproduce at a faster rate then do members of denser populations.

Keeping these biological principles in view, it will be worthwhile to keep an eye on the field as well as commensal rodent population in the cyclone affected areas. Assistance, if desired, can be sought from the Coordinating and Monitoring Centre for Rodent Research and Training, Central Arid Zone Research Institute, Jodhur.

*A note of caution circulated by the Coordinating and Monitoring Centre, Jan., 1978.

A report on rodent population in cyclone affected area in Andhra Pradesh

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For obtaining basic information on the field rodent distribution around Bapatla, a survey was made in February, 1977. After the notorious natural cyclonic calamity in that area, another survey was carried out in December, 1977. The detailed survey was restricted to 153 hectares, wherein the number of different rodent burrows were counted by live burrow counting. Some live burrows were excavated and the number of occupants and reproductive condition of the occupants were recorded to study probable litter size and breeding stage of individuals. The relation between the type of the crop with the burrow number was also recorded.

Table 1. Distribution of rodent burrows in different crops around Bapatla during pre-and post-cyclone periods

Crop	No. of hectares	Month	Total No. of burrows
Paddy	50	Feb.	375
		Dec.	750
Bajra	25	Feb.	108
		Dec.	182
Ragi	28	Feb.	84
		Dec.	70
Uncultivated fields	50	Feb.	10
		Dec.	40

The results of both the surveys undertaken during pre and post-cyclone period, are summarized in tables 1 and 2. The data indicate not only an increase in the number of field rodents but also the litter size. This enhancement of rodent numbers may be due to greater availability of good quality food from the crops lodged by the cyclone. Another factor responsible for this may be the reduction of competition induced by flooding of burrows of a number of field rodents in the cyclone affected areas. In the residual population the breeding potential increased considerably in all the species (Table 2).

Table 2. Distribution of litter size among different rodent species around Bapatla during pre-and post-cyclone periods

Rodent species	Sample size		*Embryo* Feb.	*count* Dec.	*Field* Feb.	*collection* Dec.
1. *Tatera indica*	5	Range :	1–5	1–5	—	—
		Mean :	2.5	3.5	—	—
2. *Rattus rattus*	10	Range :	1–6	1–7	—	—
		Mean :	2.5	2.5	—	—
3. *Mus booduga*	10	Range :	1–8	2–10	1–5	2–5
		Mean :	3.5	5.5	1.5	3.5
4. *Bandicota bengalensis*	15	Range :	2–5	1–7	1–4	1–4
		Mean :	2.8	4.5	1.5	2.5

Keeping these aspects in view it can be anticipated that there will be further enhancement of the natility rate of these individuals, thereby increase in numbers which will be migrating to the adjacent agroecosyetems where there will be ample lodged food for their further enormous prodigility.

Relative efficacy of three anticoagulants on *Mus musculus*

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Chlorophacinone, 0.0075 per cent treated on maize grains, fumarin and warfarin, both 0.025 percent and treated on bajra both with vegetable oil as adhesive were used for seven day feeding trial on individually caged twelve *Mus musculus*. Water was available *ad libitum* and the mice were acclamatized for a week prior to experiment. Mice started dying on 3rd day by warfarin and chlorophacinone poisoning and on 4th day with fumarin. After 7 day poison feeding the live animals were kept on a mixture of bajra and Jowar, and it was found that no mortality occurred after 13th day. It was observed that palatability of bait is highest with warfarin, followed by fumarin and chlorophacinone, but this has no correlation with the mortality rate (Table 1). It appears that warfarin is most effective, but chlorophacinone with low concentration and less acceptibility also gives good results.

Table 1. Efficacy of three anticoagulants on mortality of *Mus musculus bactrianus*

Anticoagulant tested with percent concentration	Average poison-bait consumed in seven days g/100 g body weight	Poison ingested in seven days (mg)	Poison consumed in seven days mg/kg	Percent kill
CHLOROPHACINONE (0.0075)	117.07	0.076	6.14	58.3
FUMARIN (0.025)	137.64	0.400	24.00	41.66
WARFARIN (0.025)	162.63	0.391	34.15	66.66

Bandicoot control in a hospital

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Pest Control (India) Pvt. Ltd., Madras

We were summoned to undertake rodent control in an important hospital at Calcutta. The lesser Bandicoots, *B. bengalensis* were biting the patients, both adults and children at nights. A doctor's finger was also not spared while he was sitting on a chair during night duty.

The rats were living on all the four floors of this multistoried hospital. They had adapted themselves to live among the rubbish on the terrace, inside the wall where the opening was made to pass the water pipes. A colony of 6-7 rats was also found hudling together in the false ceiling.

Since the patients were being served their dinner at 5.30 p. m., we chose 5 p. m. to be the correct time to poison the rats as they would be really hungry. We used Rodafarin-C, with biscuit powder in 1 : 19 proportion and each bait packet contained two teaspoons full of this poison bait.

The very next morning, we found seven dead *B. bengalensis*. Poison baiting was continued daily for 16 days and we collected in all 131 dead *B. bengalensis*.

Rodent control in Lakashadweep Islands

Dipak R. Shah and K. S. Subiah

Post control (India) Pvt. Ltd., Bombay and Madras

We visited Lakshadweep islands during March, 1976 in connection with rodent problem in coconut plantations. The main crop in the Island is coconut but few vegetables and fruits have been introduced as inter crops. Soil is nothing but powdered coral with guano. The coconut grown in Lakshadweep have a high oil content (about 70 per cent) and some trees bear about 500 nuts a year. The total number of trees on the islands are estimated to be 4.5 lakhs.

Early mornings it is a sad sight to see the number of damaged nuts on the ground. The rat chooses a good coconut and makes a neat hole of 1½" diameter near the stalk and feeds on the kernel and drinks the sweet water. At one locality we counted about 10 nuts per tree damaged by rats. There is no report about this Union Territory of India, without a mention of the damage to coconuts caused by rats At least 35% of these losses are due to rats i.e. about 60 lakhs of nuts worth Rs. 35 lakhs of Agricultural income.

During the earlier days, according to Mohmed Malmi of Kavaratty a progressive farmer now in his late 70's, every year from March to May the Islanders used to organize a "Rat Hunt". First they divided the Island into four blocks. Every day they assembled in Mosque and planned the days strategy. The coconut tree climbers in large numbers climbed up to the crown of the tree and chased the rats. The scared rats ran helter skelter and dropped to the ground to be beaten to death by waiting mob. This sort of systematic Rat Hunt was organised thrice a week during those three months only. The climbers got one nut per tree as their climbing fee. Mr. Malmi said that in spite of these hunts there had been no variation in the rat population, they were always there in plenty. Every year they killed about 3000 to 4000 rats.

However, the rodents are being successfully controlled with the help of Rodafarin blocks. Wheat bran, jaggery, paraffin and Rodafarin are mixed in the proportion of 8:6:4:1. The procedure, people in Lakshadweep follow, for preparing "Eli appam" is : First all the ingredients are weighed and mixed well in a flat zinc tray. The measured quantity of paraffin wax is boiled and the molten wax is poured into the tray containing the mixture. Then all the ingredients are mixed well with a wooden spoon and pressed well to form an even surface on the flat tray. This is then cut into bits of 3" x 2" by using a sharp knife and wooden reaper. Then the tray is kept for cooling over night and the next morning the "appams" are removed from the trays and stored in gunny bags. Three or four such "appams" are placed on the coconut crowns very systematically. This is organized by the Agricultural Department. This method is very successful for rat control in coconut plantation.

Rat control campaign in Punjab

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To speed up the control of rodents in Punjab a rat control project was initiated in 1976 under the campaign 'Youth for rural reconstruction' by the Directorate of Students' Welfare, Punjab Agricultural University (PAU), Ludhiana as directed by Ministry of Education and Social Welfare, Govt. of India with the collaboration of Department of Zoology, Punjab Agricultural University, Ludhiana. The NSS volunteers of various constituent colleges of PAU, Ludhiana participated in this campaign. Eight villages around Ludhiana were covered from November, 1976 to November, 1977 under four different camps. On these occasions, experts from the Department of Zoology, PAU, Ludhiana visited the various camps. Farmers were motivated to kill the rats by making them aware of the economic losses to the various

crops in the fields as well as to the stored grains. Technical know-how like the preparation of baits, prebaiting and identification of live burrows were explained to the farmers as well as to the NSS volunteers. The NSS volunteers performed the operations in the fields as in the houses. Five to six volunteers were allotted particular areas in a village.

Zinc phosphide in 2.5 concentration smeared with one percent mustard oil on wheat grains was used. Poison baits were placed near the opening of burrows. The farmers were asked to plug the opening of all burrows with soil in the evening a day before. On the following day, the reopened burrows or fresh openings were treated with zinc phosphide baits. In total, 5187 burrows and 486 houses were covered.

'Bell' the Rat in Mizoram

Ishwar Prakash
CAZRI, Jodhpur

Bamboos flower in Mizoram at an interval of 25 and 45 years. Coinciding with bamboo flowering the rodent numbers increase manifolds and invade the cultivated land, damaging paddy to an extent that scarcity of foodgrains is created in the region. It is told that 'thousands' of rodents can be seen in the fields. If this is true, what is the species of rodent which multiplies in such large numbers ? No body knows.

Dr. Vazirani of the Zoological Survey of India collected *Rattus nitidus obsoletus*, *R. rattus khyensis* and *R. rattus* sp. (?) from Mizoram fields. Another team of ZSI visited Mizoram in 1976-77 and collected *Bandicota bengalensis* and *R. rattus* (L) and *Funambulus pennanti*. Das and Dr. Sachan of the ICAR Research Complex for NEH region suggest that *R. rattus*, *R. nitidus* and *R. mentosus* are probably the most destructive and responsible for famine. The fact remains, however, that the real rodent culprit remains unidentified. It is important to reckon the species so that adequate measures for its/their control could be formulated after thoroughly studing its/their ecology and ethology.

All india rodent Seminar-1975

The seminar was held at Ahemedabad (Gujarat) and was organized by Rodent Control Project, Sidhpur in September, 1975.

Over 150 delegates, Indian and foreign participated in it. 69 technical papers were presented and the e have been published in the form of the Proceedings of *All India Rodent Seminar-1975*.

Copies of the Proceedings are available at Rs. 15/- each (50 per cent subsidised cost) + Rupees 2/- postage charge. For foreign countries postage will be charged on the basis of actual amount incurred. Interested persons may write to :

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