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Studies on the toxicity of calciferol (vit. D_2) to warfarin tolerant roof rats (*Rattus rattus*) under captivity

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Out of 20 rats tested against 0.005% warfarin for 10 days, eleven rats did not succumb to warfarin poisoning. These rats which had consumed warfarin on an average of 34.6 mg/kg b.w. (24.3–60.0 mg/kg b.w.) did not show any symptoms of illness or poisoning during days of post observation period. However, when calciferol at 0.1% in bait was tested against these warfarin tolerant rats, all of them succumbed to it within 4.8 days (2–8). The calciferol required to kill the tolerant rats was 117.4 mg/kg b.w. (54.0–167.0). It was of interest to note that though the bait containing calciferol was offered for a period of 7 days continuously, the rats consumed the bait during the first three days only as had been observed in non-tolerant rats also. It appears that calciferol at 0.1% could be used successfully to control the warfarin tolerant roof rats.

Susceptibility of house mouse (*Mus musculus*) to calciferol (vit. D_2) toxicity

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The test mice were fed with 0.05% and 0.1% calciferol carried in standard bait (Rice flour : 74 parts; wheat flour : 20 parts; groundnut cake flour : 5 parts; salt : 1 part roasted and well mixed with 12 parts of peanut oil) for 7 days. For each concentration 10 mice were used. The results pointed out that 75% of the test mice succumbed to 0.05% calciferol within 4 days while it increased to 100% when the bait contained 0.1% calciferol. It was observed that the mice consumed the bait during the first three days only and afterwards there was complete cessation of bait intake. It may be concluded from the above experiment that the concentration of calciferol in the bait should be slightly more than 0.1% to ensure complete kill of the mice population under field conditions when alternate food sources would be available.

Toxicity of RH-787 as a rodenticide for the control of rodents

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RH-787, a newer rodenticide, was administered in rodents by the stomach tube method at various dosages. The results revealed that LD_{90}, LD_{75} and LD_{50} for *T. indica*, *M. hurrianae*, *R. r. rufescens* and *R. m. pallidior* are at 5, 30, 30 and 40 mg/kg respectively (Table 1). The time to death was between 12 to 17 hours. The death of the animals was due to paralysis of their hind limbs and pulmonary arrest.

Table 1. Relative efficacy of RH-787 for the control of four species of desert rodents

Dosages administered (mg/kg)	Percent mortality			
	T. indica	*M. hurrianae*	*R. meltada*	*R. rattus*
5.0	60	—	—	10
10.0	80	—	—	10
20.0	90	30	—	25
30.0	100	75	40	50
40.0	100	100	50	80
50.0	100	100	100	100

A rodent control campaign through National Service Scheme

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The N.S.S. unit of the B.A. College of Agriculture had organized a special camp of " Youth Against Dirt and Diseases " in village Kothiakhad, of Dist. Kheda (Gujarat), during which a pilot rodent control campaign was undertaken.

The whole village was divided into five wards. Thirty two campers including the members of the youth club were divided into five groups having a group leader in each. Each group was assigned to a ward.

Various motivation techniques were used in order to get the acceptance of the campaign by the villagers. The community leaders were involved in planning and executing the campaign so that it sustains the community support. Because the camp was for 10 days only, the operation and observations during the first half of twenty days programme were made by the 32 campers, but in the second half, the follow up programme was done by members of the youth club and the villagers were trained and were put into the actual practice for rodent control programme. During the whole control operation about 1570 rodents were killed.

Report on National Rodent Control Week

G. P. Ranganathan

Save Grain Campaign Regional Office, Madras

Save Grain Campaign Regional Office, Madras organised a National Rodent Control Week in Tamilnadu, Kerala and Pondicherry involving agencies like the State Government, Youth volunteers, Farmers Training Centres and farmers themselves; and also the different mass media like T., V., Film Division, Press, Radio and finally arranging a seminar on the topic as a concluding function, mainly dealing with results of operation.

In about 850 residential premises of 5 villages, the control operation was undertaken with bait material contributed by the farmers and rodenticides (Rodafarin ' C ' and ' S ') by government. In each house one liquid and 3 dry poison baits were placed and replenished once after 2 to 4 days. Thus nearly 5000 bait stations were established in all. Examining dead rodents following species were identified occupying residential habitat i. e., *Rattus rattus*, *R. norvegicus*, *Bandicota bengalensis*, *B. indica*, *Tatera indica indica*. Some dead shrews were also collected.

In fields, burrow fumigation with ALP tablets and Zinc Phosphide baiting were undertaken in the villages simultaneously to control the field rats. 1420 acres were covered for the purpose of fumigating 17,040 rodent burrows with Aluminium Phosphide pellets (0.6 gms)

when some of the fumigated burrows were dug open to demonstrate the result the following species of rats were identified :—

1. *Tatera indica* 2. *Bandicota indica* 3. *Bandicota bengalensis* 4. *Mus booduga.* Zinc Phosphide baits were used in no man's land and bushy areas only after prebaiting for 2 days. As a result around 500 dead rats in the open were noticed.

Rodent control in China

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While participating at the UNEP Seminar on Desertification Control held in China, some information was collected on rodent control in China. At Ek—cho—league in Inner Mongolia (part of the ' Gobi ' desert), in some parts 70 per cent of the total rodent population is represented by *Rhombomys opimus.* In other parts *Citellus citellus* is the predominant species. The number of rodents vary from 150 to 350 per hectare ! with a maximum of 832 rodents in 1664 burrows. The pastures were damaged to a great extent in about 1.5 million hectares. 1.5 per cent Fluoroacetamide and 8 per cent zinc phosphide with linseed oil were used for rodent control, mixed with oats, maize, sorghum and seeds of natural vegetation like *Iris, Satta, Caragana, Corispermum.* While the whole infested area was treated, pre and post control census was done by burrow closing and opening method in plots of 0.25 hectare. In April, 1969, 1974, the poison baits were dropped by AN2 Soviet aircraft at the rate of 1 to 1.5 kg per hectare. The kill per cent varied from 97 to 100 with fluoroacetamide and 68 to 88 per cent with zinc phosphide.

At the Institute of Zoology of the Chinese Academy of Science at Peking, it was told that urine is sprayed on the poison baits of 8 per cent zinc phosphide and this results into a 60 per cent increase of the kill of *Rattus norvegicus.* It is assumed that the pheromone contained in the urine of female animals increases the poison-bait consumption.

A sub lethal electric barrier

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Pest Control (India) Pvt. Ltd., Madras

In the Philippines, farmers and Agricultural researchers have tried a myriad of fence designs to exclude rats from their fields. A farmer in Philippines harvested over 700 local measures of paddy from 12 hectares enclosed by an electrical fence during the year, 1974 dry season crop, whereas, from an adjacent 6 hectares that was unprotected, the harvest was only 15 local measures of paddy. The damage in the fenced area averaged 13.2% cut tillers, while it was almost 100% in the unprotected area.

The fence design followed closely the prototype model proposed by Denver Wildlife Research Centre. In this fence they used 1.2 cm. mesh chicken wire fence, 36 (instead of 46) cms high. This was set around the perimeter of each fenced plot, about 0.1 m. from the dikes and about 5 cm. into the paddy mud. Two rows of wires were installed on double sets of insulators along the outside of the fence; one row was about 13 cm above the ground, the second row was about 28 cm. The top 2.5 cm. of the chicken fence was curled outward. The charge on the fence itself and outer rows of wire was negative, while the central wires were positive. For test purposes they installed two shockere, one which operated from an alternating current (AC) source, and one which required DC source, to deliver high voltage pulses (0.3 seconds) at 0.7 second intervals. A 220 volt (reduced to 110 volts with a transformer) house socket was used as the AC power source and two, 12 volt car Batteries (one operating while the other was recharged) served as the DC power source. Except for a few brief periods of shortcircuit problems, the fence was operated continuously from the 10th week after transplant until harvest. Voltages on the fence were between 1000 and 7500 on dry days, and between 1000 and 4000 on wet days.

Based on the results of this preliminary trial it is suggested that sub-lethal electrical barrier holds a potential of reducing crop losses to rodent damage.

Bio-control of rodents by direct capture

R. Whitaker

Madras Snake Park, Madras-22

In many parts of India live groups of tribals still engaged in at least semi-traditional forms of hunting and gathering. The Nats of Bihar, the nomadic Kuruvas and the Irulas of Chingleput (Tamil Nadu) are three examples of hunting people who are still active. Unfortunately for them there are few animals left to hunt. All of these people hunt rats. Urbanised Kuruvas (in Madras for example) hunt *Bandicota indica* with nets and catapults. They snare palm squirrels and also lure them (close enough to shoot) with a whistle which mimics the distress cry of a baby squirrel. The Nats and Irulas hunt the field rats (*B. bengalensis*, *R. meltada* and *Tatera indica*) by digging, smoking and netting, sometimes using combinations of the 3 techniques. House rats (*R. rattus*) are snared with fish line nooses.

The economics of rodent destruction by these techniques has unfortunately not been looked into by the agencies dealing with rat control in India. This is surprising when here is an opportunity for gainful employment for thousands of tribals with highly specialised natural history knowledge. Here also is an opportunity to steer away from the ever increasing use of deadly pesticides with second life and dangerous residual effects.

It is illuminating that an average of Rs. 14/- per rat was spent in Lakshadweep during 1976 to kill a few thousand rats! Although the average cost to kill a rat in India is rarely so exorbitant, the fact remains that this most potent form of rodent control, bio-control by direct capture has remained untapped. We seem to have convinced ourselves that the costly, dangerous and complex zinc phosphide, warfarin and aluminum phosphide bait and poisoning technology of developed countries is the answer to our rodent problem. Judging from costs, results and re-infestation levels it would seem that we are far from the answer and exploration of other types of control are urgently needed.

Mimeographed proceedings of the ICAR Workshop on Rodent Research & Training, held at CAZRI, during July 1978, will be available in March 1979. Kindly write to coordinator, National Programme for Rodent Pest Management, Central Arid Zone Research Institute, Jodhpur-342003

Some preliminary observations on activity on rodent control in rural area

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An operational research project "Social Engineering Activity in Rodent Control" is functioning in about 1000 hectares of rural areas including crop fields and residential premises with the objectives (i) to extend rodent control technologies in rural area, (ii) to educate and train farmers to ensure their full participation and cooperation and proofing their residences and crops from rodents with special attention to sanitarvi improvements, and (iii) to evaluate the effectiveness and utility of rodent control by comparing the results obtained from 3 main areas under operation namely Maintenance (receiving rodent control and propaganda throughout the year); Neglected (operation and propaganda for half of the year) and Survey area (rodent control entirely left on the efforts and initiative of farming community).

During the kharif crop season pre and post control population census for different areas in terms of trap indices (No. of rodents/24 hrs 100 traps) were 5.90 and 0.43 respectively in areas under control. The species composition of the rodents in crops and bare fields was *Meriones hurrianae*, *Tatera indica*, *Rattus meltada pallidior*, *Gerbillus gleadowi*, *G. nanus indus* in order of prevalence.

In residences and backyards the rodent fauna was represented by *Rattus r. rufescens*, *Mus musculus*, *Tatera indica indica* and *Funambulus pennanti*. Control operations were taken up by using 2 per cent zinc phosphide in the crop fields and bare lands and multiple dose poisoning with warfarin based rodenticide in houses. The bait material (Bajra) and oil were contributed by the local farmers. The comparison between pre and post control census reveal that about 90-92 per cent success was achieved during the control campaign. The rural community participated in the programme after receiving a short-term training for conducting the operations in safe manner.

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