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Rodent Control by Irula Tribals

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The paper describes the results of fifty six rodent control field trials undertaken by the Irulas (primitive tribe community) Snake catchers Cooperative in Chingleput District during 1985-86. There are 28, 000 of these tribals in Chingleput District of Tamilnadu alone. Rodents are undeniably the most destructive verterbate pests on earth. The problem in India is especially acute with a significant percentage of standing and stored food grains and other crops being destroyed by rodents each year.

Irulas have traditionally caught rats for many generations as a supplementary food source (almost all species are eaten and some are quite tasty). They use two basic techniques for their rat capture : direct digging of the burrow with nets over or next to exit holes (particularly for the gerbils, *Tatera indica*); smoking them out (often used where digging is impractical or impossible like under house foundations). About 234 acres of land were covered in the present trials for an average of nine rats per acre. Each rat consumes about 20 grams of food grain per day and may destroy more than twice that amount each day. In addition to this loss, one species of rat, the lesser mole rat, (*Bandicota bengalensis*) may store large quantities of grain for the lean seasons and for its young. In the present trials 4 kg of grain was recovered from one rat burrow while the average quantity was 2.1 kg for each hoarding by *B. bengalensis*.

In one series of rice paddy bund trials in this study, (4 days in January), 3000 metres of bunds were hunted and 344 rats caught, an average of one rat for every 8.7 metres of bund. In another series of three trials carried out at an average of 64 day intervals at one farm the number of adult rats caught in the first trial was 31. In the third trial, 5 months later, only 8 adult rats were present This indicates that control visits should have an interval of 2 months or preferably less and varying according to the local crop pattern.

The Irulas methods are uniquely suited to smoke out, dig out and catch rats during crop ripening periods with minimal damage to crops. The economic aspect remains the major consideration. On the basis of the results reported herein, Irulas can make a satisfactory wage on the basis of Rs. 1.65 per rat or Rs. 15 per acre of farmland; this comp-

ares favourably with expenditure on chemical control schemes.

The most obvious advantage with the approach is avoiding continual and increasing use of poisons. There is a positive value in being able to see all the rats being caught and killed. The rats can be used safely for protein both for humans and livestock (for crocodile and chickenfarms). The scheme is labour intensive and provides jobs to people of India's lowest economic bracket. Therefore, the Irula programme for rodent control proved to be cost effective, efficient and appropriate methodology for farmlands in India.

Efficacy of Non-Poisonous Sticky Traps against Rodent Pests

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In residential premises, godowns, departmental stores, poultry houses and other confined places *Rattus rattus* and *Mus musculus* are mainly known to cause considerable damage. While it is not desirable to use any acute rodenticide, the conventionally used traps are reported to give limited success. It is also a well known fact that it is difficult to reduce the problem of *Mus* spp. either with rodenticides or traps.

M/s Gujarat Petro Synthese Ltd., Bombay supplied samples of non-poisonous sticky traps manufactured by M/s Sanko Shodoku Ltd., Japan to the Central Directorate of Plant Protection which are evaluated at residential premises at six different locations in Faridabad/Delhi. This non-poisonous trap is made up of card board of specific weight and laminated with a particular type of paper. The inner side of card board is plastered with polybutane and viscosity thickner which constitutes the sticky glue. It is claimed that its shelf life is over 5 years, if stored at temperature upto 45° C.

The traps were laid at strategic points along with wall where rodents were found to be moving more frequently. The number of traps laid per house varied between 3-8 depending on the number of rodent run-ways.

Observations were taken frequently to record the rodent catch or otherwise in traps. It was noted that in locations where the rodent population was more and minimum disturbance was there within 10 minutes after laying traps rodents were caught during the day time itself. A total of 5 rodents were found trapped simultaneously in one trap in one day and in another location as many as 12 rodents were trapped in one trap within a period of 7 days. The rodent species trapped were *Rattus rattus* and *Mus musculus*. Incidently it may be mentioned that one lizard and one squirrel were also trapped apart from some house-hold insect pest.

The preliminary evaluation revealed that these traps are ideal for use in all premises where the use of chemical rodenticide is not desirable.

Effectiveness of cholecalceferol pellets and wax blocks against *Tatera indica* and *Rattus rattus*

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The ready to use 0.075% cholecalceferol pellets and wax blocks were evaluated for their efficacy against the Indian gerbil, *Tatera indica* and House rat, *Rattus rattus* in the laboratory. The rodents were caged individually and fed on pearl millet for one week for acclimatisation.

It can be seen from Table-1 that after poison baiting with cholecalceferol pellets and wax block, 25% and 72.73% kill in *R. rattus* and 9% and 41.66% kill in *T. indica* were observed after 1 day and 3 days exposure, respectively. While with wax blocks 88.89% mortality was observed in 2 days exposure in the case of *T. indica*. The days to death varied from 4-9. Hence cholecalceferol wax blocks were found to be more effective in managing *T. indica* population as compared to cholecalceferol pellets.

Table 1. Evaluation of cholecalceferol bait against *R. rattus* and *T. indica* in no choice tests

Feeding period (days)	Cholecalceferol bait consumed (g) Mean ± SE.	Cholecalceferol ingested (mg/kg) Mean ± SE.	Percent mortality	Days to death Mean (Range)
	1. **Rattus rattus** (Pellets)			
1	5.66 ± 1.79	47.54 ± 13.06	25.0	10.0 (3-24)
3	16.75 ± 0.99	121.33 ± 7.69	72.73	12.63 (4-26)
	2 **Tatera indica** (Pellets)			
1	Mean = 3.4	Mean = 28.05	9.09	3.0 (3.0)
3	5.98 ± 0.65	38.76 ± 6.31	41.66	5.4 (3-13)
	3. **Tatera indica** (Wax blocks)			
2	13.11 ± 1.19	84.24 ± 7.59	88.89	5.1 (4-9)

Evaluation of Flocoumafen against *Funambulus pennanti*

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Efficacy of Flocoumafen (0.5% conc.) was evaluated in the laboratory against *Funambulus pennanti* at 0. 0025 and 0. 005% concentration in no choice feeding tests. The squirrels, caged individually were kept on bajra grains and water for one week before starting the experiment. In both the concentrations, 100 per cent mortality was observed in only 1 day exposure period which indicated a high potentiality of flocoumafen against this species. Interestingly, average days to death were same in both the concentrations tested but the consumption of poison is just nearly half in 0.0025% bait.

F. pennanti — 1 day no choice feeding tests.

Concentration	Exposure period	Poison bait consumed (g) Mean±S.E.	Poison ingested (mg/kg) Mean±SE	Percent mortality	Days to death Mean	Range
0.0025%	1 day	10.4±0.70	2.67±0.17	100	8.08	5-18
0.005%	1 day	9.2±0.69	4.43±0.22	100	8.11	6-12

Field Trials With Bromadiolone Against Rodents in Houses

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Field trials with Bromadiolone were carried out in three Dhanis of village Boraj, District Jaipur, Rajasthan. In each Dhani ten houses were selected. A general survey was carried out. Most of the houses were made of mud and the hygienic and sanitary conditions were poor. Poison baiting with Bromadiolone at 0. 005% concentration was carried out for one, two and three days in different Dhanis. Twenty gram poison bait was kept at one place in mud bowl. The number of sites where poison bait were kept varied from 4 to 9 per house. 3kg, 2. 25kg and 1.5 kg poison bait was utilised where baiting was done for 3, 2 and one day respectively. After this unconsumed bait was removed. The observations on mortality of rats and mice were recorded daily upto fifteen days from the begining of baiting.

The results revealed that mortality is observed on 3-4th day and maximum kills are recorded between 6-8th day of the exposure of the poison (Table)

Table : Toxicity of 0.005% Bromadiolone against domestic rodents

Day	one day exposure: No. of dead rats recovered	one day exposure: Percent Mortality	two day exposure: No. of dead rats recovered	two day exposure: Percent Mortality	three day exposure: No. of dead rats recovered	three day exposure: Percent Mortality
1	—	—	—	—	—	—
2	—	—	—	—	—	—
3	—	—	3	3.40	5	5.81
4	5	6.49	6	6.81	6	6.97
5	6	7.79	7	7.95	9	10.46
6	14	18.18	18	20.45	23	26.74
7	15	19.48	19	21.59	17	19.76
8	14	18.18	10	11.36	7	8.13
9	9	11.68	8	9.09	10	11.62
10	7	9.09	8	9.09	6	6.97
11	3	3.89	5	5.68	—	—
12	2	2.59	2	2.27	3	3.48
13	—	—	2	2.27	—	—
14	2	2.59	—	—	—	—
15	—	—	—	—	—	—

Studies on Rodent Management in the Hospitals

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The present investigation was undertaken in the Medical College Hospital and its premises, Jodhpur during 1985-86. Pretreatment trapping indicated that *Rattu rattus ruffescens* and *Mus musculus* infested the hospital wards and kitchen (40 rodents/100 traps/24 hrs). whereas the same species also occupied stores and generator room (58.3 rodents/100 traps/24 hrs.). In the outside surrounding areas, *Meriones hurrianae* and *Tatera indica* were observed, where 68.2% active burrows (out of 358 burrows) were recorded prior to treatment. Five striped squirrels, *Funambulus pennanti* were also seen frequenting the corridors of the hospital and the gardens.

Bromadiolone (0.005%) broken wheat based bait was used inside the wards and kitchen (15 bait stations) and zinc phosphide (2.0%) broken wheat based bait was used in stores (15 bait stations) and the surrounding areas for one day only. Observations were taken on 1, 2, 10 and 30th day after treatment. On

tenth day lowest population was noted (10 rodeats/100 traps/24 hrs) inside the hospital and 23.2% active burrows outside the hospital (66% control success). Bromadiolone and zinc phosphide treatments showed static population on 30th days also inside the hospital whereas in the surrounding fields the infestation showed an increasing trend (Tabie). This might be due to the migration of field rodents from the adjoining areas. The study suggests use of traps and Bromadiolone (0.005%) baiting for indoors and zinc phosphide 2.0% baiting for the outside fields for an effective and safer management of rodent pests in the hospitals.

Table : Efficacy of bromadiolone and zinc phosphide in the hospitals.

Location	Rodenticides (% Conc.)	Census				
		Precontrol	Postcontrol on day			
			1st	3rd	10th	30 th
A. In side Hospital		Census based on trap index				
(i) Ward and Kitchen	Bromadiolone (0.005%)	40.0	—	15	10	10
(ii) Stores and Generator room	Zinc phoshide (2%)	58.3	20	—	10	10
B. Outside Hospital		Census based on live burrow count (%)				
In surrounding open field	Zinc phosphide (2%)	68.2	32.9	—	23.2	45.0

Rodent Control in Poultry Farm Near Imphal, Manipur, Using Bromadiolone

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The Mantripukhri poultry farm near Imphal is spread over an area of 2-3 acres, housing more than 5000 birds in a number of pens. It also has a feed mixing unit and a feed-store, housing poultry feed for the annual requirement of the farm.

In the available land in between the poultry pens, vegetable crops eg cabbage, onion, potato, mustard etc are grown. Rodents excavated the floors of all the poultry pens and godowns. There were innumerable burrows inside the poultry houses as well as in the godowns and in the adjoining fields where vegetables are grown. Most of the gunny bags in the store were damaged by rodents and doors of the poultry pens were gnawed. Rodents also attacked the young birds and carried them away to their burrows. The attack on chicks was continued even when birds were kept on the first and second floors of the pens. Further, the spillage and contamination of grain and feed added to the damage. They fed on the maize only at the base and discarded the remaining grain and thus increasing the quantum of damage to the poultry feed. The rodent species responsible for this damage were *Bandicota bengalensis*, *Rattus rattus*, *Hadromys humei* (?) and *Mus musculus*.

Bromadiolone, a single dose anticoagulant rodenticide was tried against rodents in poultry pens. Bromadiolone (0.005% in poultry feed) was placed at 50 bait points with approximately 5 grams of bait at each point in paper packets. Subsequently, after the 9th day, the number of poison baits were increased to 100 because of heavy consumption of bait.

Around the poultry houses, the burrows of *B. bengalensis* were treated with 30 grams of bromadiolone bait per burrow.

In the storage and feed mixing centre, Rodafarin 'S' (liquid bait) was placed in the containers at the rate of 0.5 lt. at 13 places. Rodafarin 'S' was diluted in water at 1:19 ratio to prepare 0.025% Rodafarin 'S'.

Baiting was continued upto 26 days in the poultry houses and for 33 days in the godowns. In all, about 20 kg of bromadiolone treated bait and 30.5 litres of Rodafarin 'S' liquid bait was used.

In all 399 dead rodents were collected from the treated area. Most of them were *B. bengalensis* (65%) followed by *R. rattus* (20%) and *H. humei* (?) and *M. musculus* (15%). Rodents started dying from 2nd day onwards, dead rodents were recoverd upto 33 days. Obviously more rodents must have died in their burrows. Thereafter no damage was noticed in the poultry pens and storage and feed mixing unit.

Another encouraging observation was, no case of non-target poisoning or secondary poisoning either with bromadiolone or with Rodafarin 'S' baits was observed. Though, there was a dog belonging to the Poultry Officer, was found to be feeding on dead rats during the early hours of the day, nothing had happened to the dog. It indicates that

the anticoagulant rodenticides used were quite safe for non-target species.

The cost benefit ratio was calculated on the basis of the quantity of food consumed by rodents, per day. If we cosider the rodent population in the trial area as 500 since 399 dead were collected and assume atleast another 100 must have died elsewhere), and the fact that a rat eats 15 gms a day, the feed they would consume is 2737.5 kg per year. In the poultry feed the major cereal is maize. The rats feed only on the germ-portion (Endosperm) and discard the rest of the grain. Therefore atleast four times the feed they consume is discarded, spilled or contaminated, which cannot be used for the preparation of poultry-feed. This accounts for a loss of 10,950 kg of grain per year or Rs. 27,375.00 (@ Rs. 2.50/kg) per year, due to rodents.

The cost benefit ratio calculated with this figure is about 1:293 (For Re.1/- spent, the grain saved is worth Rs. 293/-). In this estimation the loss of eggs, damage to gunny bags, deformation of doors and killing of chicks have not been taken into account.

Behavioural and metabolic responses of male GoldenH amster to natural and artificial pheromones of female

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The pheromones not only trigger behavioural responses in mammals but also produce physiological and biochemical changes. In this context, the vaginal smear is reported to be one of the most effective stimulus in Golden hamster (*Mesocricetus auratus*). It increases the testesteron level, reduces aggressive behaviour and stimulates sex behavior, of males if exposed to the smell.

The effect of exposure of vaginal smears and artificial sex pheromones on biochemical changes in the blood in males was studied. The artificial sex pheromones consisted of t-butantiol, t-pentantiol and s-isopentantiol groups. Simple water was used in the control. For studying the dynamics of changes in blood glucose, which is mainly a sympathetic adrenal response system. 0.05 ml blood samples were drawn three times, i.e., before exposure, immediately after exposure (within 3 minutes) and 15 minutes after exposure.

The results showed a significant increase in blood glucose level due to exposure to smell of vaginal smears and artificial pheromones (35 and 43%, respectively), whereas in control, water had no such effect at all. This increase in blood glucose level is correlated with sex pheromones concentration in Golden hamster. This study helps in understanding the mechanism of responses of chemical stimuli in golden hamster.

NOTES & NEWS

1. Dr. I. Prakash, Professor of Eminence was elected as the Foreign Fellow of the All-Union Theriological Society of the USSR Academy of Sciences. He was awarded the Diploma by the Hon. Ambassador of USSR at New Delhi.
2. Two new cooperating centres of AICRP on Rodent Control, sanctioned during the Seventh Plan, started functioning at Dr. Y.S. Parmar University of Horticulture and Forestry, Solan (H.P.) and Gujarat Agricultural Univ., Junagarh. Solan centre will lay greater emphasis on Rodent Management in horticultural crops and Junagarh centre on groundnut.
3. Twelfth Apex level Training on Rodent Control, under the aegis of National Programme on Rodent Management, was organised by the Coordinating Unit of AICRP on Rodent Control at CAZRI, Jodhpur from 14-16 April 1987.
4. Shri Mohd. Idris, Research Associate was awarded Ph. D. degree from University of Jodhpur, Jodhpur for his thesis entitled "Structure and function of ventral scent marking gland of Indian gerbil, *Tatera indica indica* Hardwicke and role of odours in behavioural communication" under the supervision of Dr. I. Prakash, Professor of Eminence.
5. The fifth Workshop of AICRP on Rodent Control is to be organised at ICAR Research Complex for NEH Region, Shillong from 24-26 February 1988.

Contributions for inclusion in the Newsletter may please be forwarded to :
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