

RODENT

Newsletter

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ALL INDIA COORDINATED RESEARCH PROJECT ON RODENT CONTROL

**Central Arid Zone Research Institute
Jodhpur - 342 003, India**

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AICRP on Rodent Control
Central Arid Zone Research Institute
Jodhpur - 342 003, India

Diversity and Abundance of Rodent Species at Harsh Parbat, Sikar, Rajasthan

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In connection with the Project 'Studies on the faunal diversity of Thar desert in Rajasthan' extensive surveys are being conducted in the different desert habitats of the State since 2000 A.D. From direct observation and systematic trapping it has been found that almost all the habitats such as sand dunes, sandy arable lands, irrigated farms, fallows, dry deciduous forests, dry riverbeds, rocky hills and residential areas lying within the desert zone are abounding with huge populations of rodents, but with a very few number of species, usually one to five. However during the survey of Harsh Parbat, Sikar district, relatively much greater species diversity combined with abundance was found. The present article describes the details of rodent species composition and their relative abundance at Harsh Parbat.

Harsh Parbat (27° 30'02" N, 75 10'29" E), a small section of Aravalli range, rises from about 10 km. south east of Sikar town and its elevation goes up to about 936 m. near Harsh Nath Temple. Greater parts of the lower hills have been brought under cultivation of *jowar*, *bajra* and vegetables, while upper hills support only a few stray patches of cultivated land. Entire hill is rocky containing thin to moderate layer of top soil. Extensive plantation programme is being carried out in many parts of the hill. As a result entire Harsh Parbat looks greener than the surrounding plains. Important plant species are *Aldusa*, *Churel*, *Thor*, *Solar*, *Dho*, *Agare*, *Peepal*, *Jhari*, *Eucalyptus* and *Prosopis*. There are scattered growths of shrubs and grasses of different species. Only one metallic road of about 11 km. stretch goes from foothills up to the temple.

The area was surveyed during November, 9-11, 2000 and September, 12-14, 2002 with special reference to mammalian species. On both the occasions same stretch of sloping land of about 100 x 100 m. area just below Harsh Nath temple was selected for trapping. The altitude of the study plot varied from about 800-900 m. Only a small portion measuring about 18 X 24m of the said plot was under cultivation, while rest of the area was covered either by naked rocks or by various species of grass, shrubs and trees as mentioned above. A total of 120 snap traps were placed round the clock in five line transects. Three kinds of baits viz., roasted dry fish, roasted coconut and peanut butter were used in equal number of traps. Traps were inspected at 06.00 AM, 12.00 noon, 06.00 PM and 11 PM daily. Each time, baits were replenished with fresh material. Traps with specimen were removed at the time of each inspection, after setting a new trap at the same spot with same bait material. List of species along with number of specimens collected and bait preference are shown in Table 1.

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Table 1. Rodent species diversity and abundance at Harsh Parbat, Sikar district, Rajasthan.

Name of the Species	Total no. of specimen trapped	No. of specimens trapped with each of bait		
		Peanut butter	Roasted dry fish	Roasted acoconut
<i>Rattus rattus</i>	18	3	7	8
<i>Cremnomys cutchicus</i>	22	6	1	15
<i>Golunda ellioti</i>	7	2	-	5
<i>Mus saxicola</i>	14	8	1	5
<i>Mus musculus</i>	7	2	4	1
<i>Millardia meltada</i>	4	1	1	2
<i>Tatera indica</i>	14	6	1	7

All the specimens of *Golunda ellioti*, two of *Mus saxicola*, one each of *Rattus rattus* and *Tatera indica* were collected either during inspection at 12.00 noon or 06.00 PM, while rest were obtained at 11.00 PM or 06.00 AM. Apart from the rodent species collected by trapping, a fairly good population of *Fummbulus pennanti*, and one specimen of *Hytrix indica* could be sighted in and around study plot during the surveys. From the study it has been found that at least nine species of rodents occur at Harsh Parbat of which *Cremnomys cutchicus* appeared to be most dominant in the area.

Condition aversion in house rats, *Rattus rattus alexandrinus*

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Condition aversion (CA) is a phenomenon by which an animal learns to reduce or avoid the subsequent intake of a poisoned food after experiencing a sub lethal dose of that poison as well as the same food even if it is not poisoned. CA in rodents to food with poison is synonymous with poison shyness and without poison, with bait shyness. In eliciting the aversive response of the animal to the food and poison, the poison acts as unconditional stimulus. The present work was conducted to study the potential of zinc phosphide for inducing CA in house rats, *Rattus rattus alexandrinus*.

House rats collected from poultry farms of Punjab Agricultural University, Ludhiana were sent to Zoological Survey of India (ZSI), Kolkata for their identification at subspecies level. These rats were identified as *Rattus rattus*

alexandrinus. The identified rats (n=15) were acclimatized for 10 days in laboratory cages (36 cm x 23 cm x 23cm). During this period they were given WSO-mix (a mixture of wheat grains, ground sugar and groundnut oil at a ratio of 96:2:2 and water *ad libitum*). First, rats were provided with 0.05% zinc phosphide + WSO-mix (sub-lethal dose) and plain WSO-mix for 4 h in bi-choice test. Consumption of both poisoned and plain food was recorded after 4 h and mortality was also observed. Significantly lower consumption of poisoned bait than the plain bait was observed, showing that *R. rattus* is able to discriminate the poison in diet. Out of the 15 rats, three rats that had taken more amount of sub-lethal dose of zinc phosphide (0.05%) bait died after 1 day. After a week, the remaining 12 rats were exposed to 0.1% zinc phosphide bait for 4 h in bi-choice. Two more rats died after this exposure. Again after a week rest of the 10 rats were exposed to 0.2% zinc phosphide for 4 h. As a result, six more rats died and the remaining 4 rats were again exposed to 0.2% zinc phosphide. This exercise was performed to find out whether the surviving rats can associate their memory with the toxicity of bait. Two rats died again and the remaining two were the aversive rats, which were able to recall their prior exposure to 0.2% zinc phosphide. These aversive rats were then exposed to 0.2% zinc phosphide bait for 4 h, in bi-choice after every week till their mortality. Interestingly, these two aversive rats started to avoid not only the poisoned food (poison shyness) but the plain bait (bait shyness) also. This phenomenon may be explained as condition aversion. One aversive rat died after 52 days and the other highly aversive rat died after 243 days. This rat totally avoided the poisoned bait (100% aversion) and also the plain bait on 59th day and then after 243 days, showing that with successive exposures, aversive responses towards lethal bait became stronger and the rats learned to avoid it.

Histopathological Changes induced by Difethialone : A New Rodenticide in Ovary of Black Rats, *Rattus rattus*

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Sexually mature and healthy black rats (*Rattus rattus*) were used for experimental purpose. The rats were orally fed with 0.0025 per cent difethialone mixed bait for 24, 48 and 72 hours, respectively as mentioned below :

- **After 24 hours** : Dilation of blood vessels, mild fibroses in interstitial tissues with well-developed graffian follicle and germinating follicles were observed. Interstitial tissue revealed degenerative granulosa cells with pyknotic and karyorrhexis nuclei.

- **After 48 hours** : Dilation of blood vessels with focal haemorrhage in interstitial issue with degenerated granulosa cells and mild degree of fibrosis were observed. Graffian follicles revealed degenerative changes and nuclear change i.e. karyopyknosis, karyolysis and karyorrhexis.
- **After 72 hours** : Focal hemorrhage in interstitial issue with degenerated granulosa cells and congested and dilated blood vessels were pronounced. Degenerative follicles and graffian follicles with karyorrhexis and karyolytic nuclei were observed.

Observation on difethialone safety to non-target species in an arid agro-ecosystem

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Difethialone, a second-generation anticoagulant rodenticide of hydroxy-4-benzo-thio-pyranones family was evaluated extensively in laboratory and fields. It proved quite efficacious in containing pest rodents of arid region. At 0.0025 per cent concentration difethialone provided over 80 per cent kill of pest rodents in laboratory and crop fields and commensal sites after one-day baiting. During the field experiments most of the pest species viz., *Meriones hurrianae* and *Tatera indica* succumbed to the rodenticidal baits inside the burrows, however, 45 dead rodents were collected from the fields. All these were confirmed for anticoagulant poisoning. The experimental area had population of several mammalian, reptile and bird predators viz., cats, dogs, mongoose, varanids, snakes, crow, kites etc. On three occasions the mammalian predators were seen to devour the poisoned rodents @ 1-2 each, but no sign of poisoning as well as death of any predator species was recorded. At several places burrows having dead rodents were found dug open by dogs and varanids to fetch the dead/poisoned rodents, but no secondary toxicity in these non-target species was observed. Even during laboratory studies the dead rodents succumbing to difethialone poisoning at different dosages (up to 0.01 per cent) buried near the laboratory; were also observed to be retrieved and devoured by mongoose and monitor lizards, but no mortality of these predators were reported.

These observations indicate that difethialone is relatively safe to vertebrate predators as far as secondary poisoning is concerned.

Observations on debarking activity of *Funambulus pennanti* and *Bandicota bengalensis* to tree plantations of arid region

MOHD. IDRIS

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The squirrels, *F. pennanti* is considered as a serious pest in fruit orchards and nurseries. It also causes immense damage to sprouting seeds of forestry plantations in nurseries. Debarking of forestry plantations by gerbils like, *Meriones hurrianae* and *Tatera indica* is well reported from arid zone, however, debarking by squirrels is lesser known in arid regions. This activity was first observed in neem trees during 1995. Recently the squirrels were noticed to debark the tender branches of *Acacia nilotica*. More than 50 squirrels were observed in the close vicinity of the affected trees but the debarking instinct was recorded in a few individuals only.

In another incidence lesser bandicoot rat, *B. bengalensis* was observed to debark the branches of *Prosopis cineraria* tree growing in the rattery. The bandicoots (six males and six females) were released in the rattery to record their behavioural activities towards desert trees. The bandicoots were noticed to dug fresh burrows near this tree and peeled of the bark of the branches to the tune of 15-20 per cent. The debarked branches dried completely.

NEW AREAS OF RODENT RESEARCH

(Based on Research Highlights of National Wildlife Research Centre, U.S. D.A. Fort Collins, USA)

- **Development of Contraceptive for Rodents :** The use of diazocosterol (Diazacon ®) as a potential wildlife contraceptive is currently being investigated on wild Norway rats. Diazocosterol (diazocholesteral Hcl) is a cholesterol inhibitor that is capable of inhibiting reproductive hormone synthesis for a period of several months. It, therefore, has the potential to be useful as a tool for population control in a variety of animals. Historically it has been used with variable success to reduce populations of urban pigeons, which breed round the year. Theoretically, success rates with this compounds should be higher in wildlife population, which breed seasonally like rodents.
- **Non lethal predatory odours for reducing Rat damage to Agriculture Crops :** Chemical repellents derived from predators may offer more effective and long lasting protection from the rodents than the measures currently in use. An earlier study in Hawaii (NWRC 1996) found that rats avoided tarps soiled by the mongoose, suggesting that rats may have an innate or learned avoidance response to mongoose. Field studies using mongoose faces or urine in traps indicated that more rats were captured in traps soiled with mongoose faeces than the traps soiled with mongoose urine or unsoiled traps. But in the laboratory studies such an effect was not seen.

The discrepancy between the laboratory and field results in this study indicates that research should incorporate reverent factors in the natural environment into their test paradigm and interact the result of tests with captive animal cautiously. The results from field studies indicate that additional research is warranted to determine the active compound (s) in mongoose faeces that repel rats and to explore that use of such compounds to the reduce rat damage to agricultural crops.

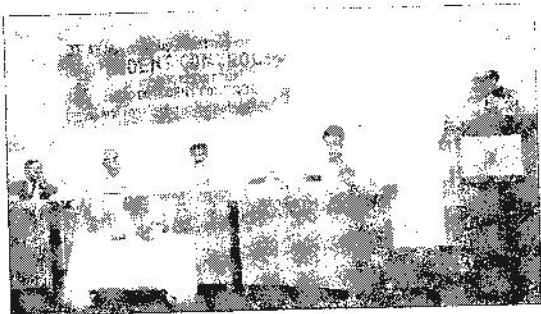
- **Economic thresholds for controlling Rats Damage to Macadamia nuts :** Damage was simulated by removing 10%-30% of the developing nut clusters from trees at 90,120 and 150 days after sowing. Removal of 10% of the crop load had no measurable effect on yields of mature nuts, regardless of when damage was inflicted. Yields of trees with 30% of nuts removed different from yields of trees only when damage was inflicted at 150 days after flowering.
- **Improving Methods for applying Rodenticides in Macadamia Orchards :** Macadamia growers in Hawaii try to control troublesome rat population in their orchards mainly by the broadcasting rodenticides on the orchards floor. In view of the facts rats spend little time on the ground in Macadam orchards, ground application of rodenticides becomes ineffective. Baits placed on the trees were consumed more than the baits broadcasts on ground. Acceptance was intermediate where the bait had been placed in the burrows.

These results call in to question the effectiveness of rat control programs that broadcasts rodenticide baits on the orchard floor. Placing the bait on the targets trees makes rats to eat the poison more likely. (Compiled by Dr. S. Sridhara UAS, Bangalore)

ELEVENTH ALL INDIA GROUP MEETING ON RODENT CONTROL

The Eleventh Group Meeting of All India Network Project on Rodent Control was organized under the aegis of ICAR, New Delhi at Central Arid Zone Research Institute, Jodhpur from November 12-14 2002. Mr. K.K. Chaudhuri, IFS, Director, Arid Forest Research Institute, Jodhpur graced the Occasion as Chief Guest and Dr. O.P. Dubey, Asstt. Director General (PP) ICAR was the Guest of Honour. Dr. K.N.K. Chauhan, Director (Officiating), CAZRI, Jodhpur presided over the function.

Mr. K.K. Chaudhuri placed wreaths on the photographs of Late Drs. Ishwar Prakash and Chander Sheikher, the two great rodentologists of the country who left for heavenly abode this year. Dr. B.D. Rana presented the Progress Report of the Project and highlighted the growth of the AINP in term of budget outlays and manpower.



Dr. O.P. Dubey, Assistant Director General, ICAR, New Delhi addressing the delegates during Inauguration of the Eleventh All India Group Meeting on Rodent Control on November 12, 2002.

Dr. O.P. Dubey, in his address outlined the problem of rodent pests in NEH Region with special reference to possible rodent outbreak during the period of bamboo flowering in the coming years. He called upon the rodent scientists to reorient and diversify their research efforts in tune with other countries and work on a mission mode approach. Dr. Chauhan expressed great satisfaction with the achievements of the Coordinated Project on Rodent Control and highlighted the role of CAZRI, Jodhpur as Leaders of the Rodent Research in India. He emphasized that the technologies developed by the Project must effectively reach the farmers through different extension programmes.

Mr. K.K. Chaudhuri, in his inaugural address outlined the devastating potentialities of rodents in agriculture and health sectors. He opined that some research input should be provided to forestry sector too which suffer a lot due to rodent depredation. He suggested that work on plant products, anti fertility agents, microbes and predators should also be taken up by the Project scientists on priority, as the biological control of rodent pests is safer, effective and has greater sustainability. For this collaboration from allied Institutions may also be sought. He emphasized that M.Sc. and Ph.D. programmes in rodentology should also be initiated by Indian Universities in order to create a strong scientific research on this aspect of plant protection. On this occasion a souvenir entitled "*Glimpses of Rodent Research in India*" brought out in the memory of Dr. Ishwar Prakash was released by honourable chief guest.

The Group Meeting was conducted in six technical and a plenary sessions. The meeting was attended by 40 delegates from ICAR Head Quarters, AICRP Centres, Universities and other Research Organizations, Central and State Departments, NGOs and Pesticide Industries. Several recommendations for farmers, scientists and policy planners were approved by the august house. In the memory of Dr. Ishwar Prakash, a brain storming session on "Coordinated Research on Rodent Control in India- a retrospection and vision for 21st century" was organized on 14.11.2002. The house organized a felicitation function in the honour of Dr. B.D. Rana who is to retire from ICAR services on 31.12.2002.

Contributions for inclusion in the Newsletter may please be forwarded along with 1-2 good black & white photographs to :

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