RODENT
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ALL INDIA COORDINATED
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RODENT CONTROL

CENTRAL ARID ZONE
RESEARCH INSTITUTE,
JODHPUR 342 003

RODENT NEWSLETTER

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New Record of *Rattus norvegicus* (Berkenhout) from North Eastern Hill Region of India

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ICAR Research Complex for NEH Region, Barapani – 793103 Meghalaya

The Norway Rat or Brown rat, *Rattus norvegicus* (Berkenhout) is not native of India but it has been reported from the Indian sea-ports as a established rodent species. During the survey in 1985, *R. norvegicus* was collected alongwith *Bandicota bengalensis* (Gray) and *Rattus rattus* (L) from Iewduh or Barabazar area of Shillong, Meghalaya. These rats were found to make their burrows or colony near the shops, godowns and garbage. In 1989, the population of *R. norvegicus* was studied and it was found that this species constituted 16.9% of the total rodent collection from Barabazar area of Shillong. Later, while field rodent surveys in Mizoram, some specimens of *R. norvegicus* were also collected from the capital city, Aizawl. This rat may have been transported to this region alongwith the food articles and established near the godowns in these cities.

Effect of Bromadiolone in Rodent Control in Coconut Trees

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Soil and Water Management Research Institute (TNAU) Kattuthottam, Thanjavur – 613501

Amongst plantation crops, coconut is severely damaged by rodents from third month onwards in nursery to seedlings, in crown to tender and matured nuts and in storage to copra by different species. Damage to tender and mature nuts showed round injury hole, inner contents eaten and juice drained out completely. Damage around 50 per cent to matured nuts, 9-30 per cent to tender nuts and 8 per cent in nursery were reported elsewhere.

A field experiment on control of rodents in coconut with bromadiolone (0.005 per cent) was conducted at Soil and Water Management Research Institute, Kattuthottam, Thanjavur from July 1993 to July 1994. Bromadiolone (0.005 per cent) cake coated with wax and jaggery were placed in the inner whorls of crown of trees at the rate of 1 cake per tree (100 g). Once in four months, one cake is separated into six pieces and placed at six

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places in the whorls and totally three rounds of baiting were done in a year. The results revealed that baiting with bromadiolone cake in the inner whorls of crown recorded significantly less rodent damage to nuts. Bromadiolone treated trees accounted for only 1.23% nut damage whereas it was 9.5% in case of untreated trees for a total of thirty trees in each treatment.

Rodent Proof Local Grain Storage in Arunachal Pradesh

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During the survey of rodent pests at Basar area in Arunachal Pradesh interesting local rodent proof grain storage system were noticed. These storage structures are made up of wood, bamboo and thatch grass. The storage type structure was found to be raised on wooden pillars, floor and walls made of bamboo and thin logs of wood and the roof was of thatch grass and bamboo (Fig 1). These structures are generally raised outside the villages.

Fig 1 Rodent proof storage structure in rural areas of Arunachal Pradesh

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For rodent proofing the wooden pillars were covered with the inverted fully front open tin canster (a 15 litre tin can which is commonly used for keeping oil or ghee).

Due to placement of the cans, the rodents can not approach the storage structures. As soon as they climb on pillars and reach in the tin can they can not move further upwards due to the blockade by the base of the tin can. Therefore, they try to move along the wall of the tin unsuccessfully and fall down on the ground. Interview with the villagers revealed that they do not have rodent problem in their storages. Thus such storage structures, being of low cost, easy device and developed by the tribals of Arunachal Pradesh successfully protect the food grains from rodents during storage.

Magnitude of Rodent Depredation in Cotton

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Assessment of rodent depredation was initiated in 90 days old cotton crop (1 ha) near Matripu village of Nagapattinam Quaid-E-Milleth district, Tamilnadu. In the selected study plots, the number of rows were enumerated and at every tenth row of the crop, randomly 20 plants were sampled wherein number of cut (unripe and ripe bolls of cotton) and uncut cotton plants were counted for computation of per cent depredation by the rodents. The damage was observed in both the unripe and ripe bolls. The damaged unripe and ripe bolls of the cotton were observed lying around the standing crops and on pathways of the rodents after being partially fed. On an average rodents caused 55% depredation. The damage was more in the unripe bolls than in the ripe bolls in the ratio of 4 : 1. This may probably be due to higher palatability of unripe bolls. The damaged bolls were observed at the burrow entrances of the *Bandicota bengalensis* and in few instances the damaged bolls were observed to be used as plugging material for their burrows.

Rodent Infestation in Oil Palm in Tranquebar Taluk, Tamilnadu

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Studies were initiated in one year old saplings of west African, exotic oil palm, Tanara variety, transplanted in a triangular shape with 9m intervals at the rate of 54 saplings per acre. Obervations on rodent infestation were recorded in oil palm orchard (30 acres) located at village Nellaveli, Tamilnadu. It was observed that a total of 182 plants were damaged at Neelaveli, during May 1994. The rodents caused damage to the nut part and frond regio of the saplings. The soil was excavated by the rodents and the burried nut part and frond were cut and eaten. Due to this, plants died and the leaves dried. This caused severe menace to the farmers and made them to replace with fresh sapling. The bunds of the fields were observed to have rodent burrows of *Bandicota bengalensis*, (9/acre) predominantly, followed by *Millardia meltada* (5/acre) and *Mus booduga* (2/acre). The current rate of damage 11.24% (6 saplings/acre) may be reduced with the help of effective rodent control methods such as trapping, burrow digging and zinc phosphide poison baiting in the field. Survey for knowing the presence of barn owl (*Tyto alba*) a potential bio-control agent revealed that there are many nesting/roosting sites of barn owls. So, it is felt that farmers can errect nest boxes of barn owl for the control of rodent pests.

Rodent Damage in Pineapple Gardens of Coleroon River Bank, Tamilnadu

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The Pineapple (*Ananas* sp.) is inter cropped with coconut (*Cocos nucifera*) plantations on the Coleroon river banks of Tamil Nadu. Farmers have planted Pineapple between two rows of coconut plantations. Row to row distance between pineapple plants was 30cm.

A study was made to assess the rodent damage in the pineapple inter cropped with coconut plantation in one hactare area during the month of May, 1994. In all 78 fruits from 78 randomly selected pineapple plants were examined for rodent damage. It was recorded that 44.44% fruits were damaged by rodents. They damaged one month semi ripened fruits easily which emerged from the crown part of the plant and touching the ground due to their weight. But in the early stages the fruits were in the crown stalk portion which is 2 feet off from the ground and surrounding thorny leaves also protected the fruits from rodent attack. No live burrow of any rodent species was noticed in the area. Hence, the house rat (*Rattus rattus*) that inhabited the coconut grove could have caused damage to the fruits as a whole or partially especially in the upper portion.

Burrow Fumigator – A New Device for Rodent Control

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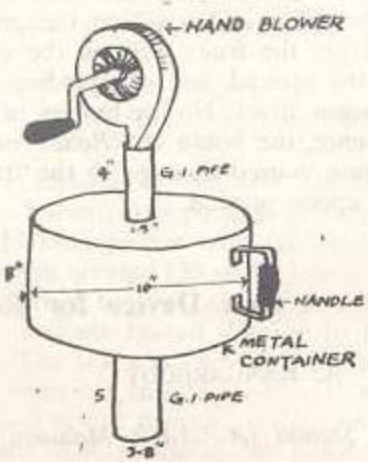
Rodents, particularly field types are one of the most important non-insect pests of field crops. Most of the field rodents live in burrows for shelter, protection from predators and thermo-regulation. Killing these subterranean animals by fumigating their burrows with natural smoke is an age old practice. The death of the exposed animals take place due to suffocation or lack of oxygen. The fumigated smoke mainly, contains carbon dioxide and carbon monoxide.

After 1986 Godavari floods, the rodent problem in twin districts of Godavari increased and reached to peak in 1988. During that period; the Scientists of APAU had an opportunity to see that the rats in rice fields are being killed by some tribal people with natural smoke. The whole equipment used for fumigating the burrows was a small earthen pot with a hole on the base. They fill the pot with paddy straw and ignite with a match stick. As the paddy straw catches fire, the mouth of the pot is placed on the burrow opening and air is blown with mouth slowly through the hole into the pots liberating smoke. Thus the liberated smoke pass into the burrow and within 10-15 minutes all the tunnels of the burrow are filled with the smoke and the animals living inside will die of stuffocation.

Based on the same principle a compact and handy device called "Burrow Fumigator or Smoke Fumigator" was designed and developed for the control of subterranean rodents in irrigated paddy fields. The unit consists of a



Burrow Fumigator

The following are the advantages of the burrow fumigator.

- *** Easy to operate**
- *** More effective**
- *** Results can be seen immediately**
- *** Less time required to fumigate a burrow (3-5 minutes)**
- *** Large areas can be covered (a pair can cover 2 hectares/day)**
- *** Less expensive**
- *** Long life**
- *** No chemical hazards.**

Designed and developed by **Dr. A. Rangareddy, Rodent Zoologist; R. Subramanyam Reddy, Agril. Engineer and Dr. N. Sree Rama Reddy, Senior Scientist (Rice); A.P. Agricultural University.**

hollow cylinder of 10" diameter and 8" height made of 15 gauge M S sheet. There is an inlet on the top made of 1.5" G.I. pipe of 4" length. The outlet is at the bottom made of 3.8" G.I. pipe of 5" length. Handle is provided at the side to carry the unit from place to place.

The cylindrical portion of the unit is stuffed with paddy straw through the outlet and ignited. As the straw catches fire, air is blown slowly by rotating the hand blower inserted into the top inlet. In the initial stage, thick yellowish smoke comes out through the outlet pipe. Then the outlet of the smoke fumigator is kept on the opening of the rat burrow, smoke enters into the burrow and within a short time (3 to 5 minutes), all the tunnels of the burrow are filled with smoke killing all rats with their litter inside. Generally, two persons are required to operate the equipment, one is meant for blowing the air and the other to block the leakage of smoke and also to kill the escaping rats. The total cost of the equipment is Rs. 400/-, which can be purchased even by the marginal farmers

Rodent Fauna of Different habitats of Jodhpur and Sikar District (Rajasthan)

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Ecological evaluation of rodent fauna inhabiting sand dunes, stabilized sand, gravel and rocky and dry river beds of Sikar and Jodhpur districts of Rajasthan was undertaken to understand the species density (Trap index), their distribution and biological rhythm. In all , the rodent species representing the families Scuiridae and muridae were live trapped with the help of sherman traps.

Meriones hurrianae and *Tatera indica* were present in all the study habitats in variable numbers. Both the gerbils constituted about 60% of total rodents trapped is stabilised sandy habitat, however, in the gravel and rocky and dry river beds their population was 30 and 33% respectively. Hairy footed gerbil, *Gerbillus gleadowi* was most predominant on the sand dunes (64.0%) and was not observed in the rocky and dry river beds. The only scuirid species, *Funambulus pennanti* was not trapped in sand dunes and gravel region but inhabited stabilized sands and rocky habitats due to presence of some tree species viz., *Acacia tortilis* and *Prosopis cineraria*. *Mus platythrix*,

Rattus cutchicus and *Rattus gleadowi* were habitat specific because the former two species were trapped from rocky habitat and the later one from gravelly habitat only (Table 1).

Biological rhythm of coexisting species of gerbils indicated two peak activity cycles. However, in the nocturnal species, *T. indica, G. gleadowi* and *G. nanus*, the activity period was very much dependent upon moon light. Two short peaks of foraging was noticed in the moonlit nights.

Table 1. *Rodent species densities (trap index) in different habitats of Sikar and Jodhpur districts (Rajasthan)*

Species	Sand dunes (Sikar)	Stabilised sand (Sikar)	Gravel (Jodhpur)	Rocky & dry rivers beds (Jodhpur
Funambulus pennanti	–	1.0	–	1.3
Gerbillus gleadowi	64.0	1.7	1.0	–
Gerbillus nanus	–	0.5	12.7	4.5
Tatera indica	0.3	26.3	15.0	5.0
Meriones hurrianae	3.7	33.5	16.3	28.0
Mus musculus	–	–	–	0.3
Mus booduga	0.3	0.2	0.3	–
Mus platythrix	–	–	–	5.0
Rattus cutchicus	–	–	–	1.0
Rattus gleadowi	–	–	3.0	–

Brief Report of VIII Group Meeting of AICRP on Rodent Control

The Eighth Group Meeting of All India Coordinated Research Project on Rodent Control was organised at Gujarat Agricultural University, Junagadh from December 29-31, 1994. The Meeting was divided into an Inaugural, four Technical Sessions and a Plenary Session. The Meeting was attended by over 40 participants representing the AICRP Centres, ICAR Institutes, Agricultural Universities, Directorate of Plant Protection Quarantine and Storage (GOI), State Agriculture Departments and Private companies engaged in rodenticidal production and development.

The Meeting was inaugurated with the lightening of lamp and invocation in the GAU Auditorium. Dr. K. Janaki Raman, Director (Research), G.A.U., Ahmedabad welcomed the participants and delegates. In his welcome address, Dr. Janaki Raman emphasized the significance of organising the Group Meeting at Junagadh and highlighted the problem of rodent pests in agriculture, storage, public health and several other non-agricultural sectors. Dr. V.J. Patel, Director Campus, Junagadh and Chairman of the Inaugural Session, Dr. O.P. Dubey, Principal Scientist, ICAR, New Delhi and Dr. P.K. Ghosh, former Project Coordinator (Rodent Control) and Chief Guest of the Session also addressed the delegates. Shri Govind Bhai Shekda, Vice Chancellor, GAU could not attend the session due to ill-health but sent his blessings which was read during the Inaugural ceremony. Dr. B.D. Rana, Project Coordinator read out the salient achievements of the AICRP on Rodent Control during the last two years. The Inaugural Session ended with a vote of thanks proposed by Dr. D.D. Malviya, Principal, College of Agriculture, Junagadh.

During the Technical Session I, Progress Report of all the Cooperating Centres of the AICRP were presented and discussed in detail. Second Technical Session was devoted to the Reports of self funded centres, State Agricultural Departments, Research and Development wings of Pesticide manufacturers, etc. During th session the work on barn owl as a bio-control agent of rodents and the success story of Rodent Control during rodent famine in Gujarat State were highly appreciated by the house. Future Research Programmes for the AICRP Centres were discussed and formulated in the third Technical Session. The programmes included multilocational as well as location specific studies for various cooperating centres. Next session was devoted to Constraint Analysis, Extension and Recommendations. In this session several recommendations related to scientific/technical/administrative nature were made for improving the efficiency of research and extension of rodent management at national level. The house also formulated a schedule for management of rodent pests in different agricultural and plantation crops. The Group Meeting ended with the Plenary Session wherein Chairmen of all the Technical Sessions presented their reports. At the end Dr. O.P. Dubey proposed the vote of thanks.

Salient Acheivements of AICRP on Rodent Control (1992-94)

B. D. RANA

Project Coordinator (Rodent Control)
Central Arid Zone Research Institute, Jodhpur

The lesser bandicoot rat, *Bandicota bengalensis* continued its predominance in hierarchy of rodent pests of Indian agriculture. In the irrigated fields of Punjab, U.P., Karnataka and Gujarat states, the predominant species were *B. bengalensis, Tatera indica, Rattus meltada, Golunda ellioti* and *Mus* species. In Himachal Pradesh, however, fruit orchards were infested by *B. bengalensis* and *M. musculus*. The Indira Gandhi Canal command areas under irrigation for five years did not register any major change in rodent pest structure.

Rodent damage to wheat was 2.02 - 10.3% in Punjab and 2.1 - 17.14% in Gujarat. The upland paddy crop suffered (11.7%) comparatively lesser damage than the low land crops (12.9%) in NEH region. Effect of floods on rodent behaviour in Punjab revealed less damage (0.6%) in flooded rice fields than those of non- flooded rice fields (4.0%). Among pulse crops, gram suffered about 2.7% and 2.3-7.8% rodent damage in M.P. and Gujarat respectively. In sugarcane crop the loss was estimated to be 5.2% or 29 q/ha in Punjab. However, micro plot studies on squirrel damage to 100 released sugarcane varieties revealed 13.7% (COLK 8102) to 100% (COLK 7810) damage. Similarly 2.82 - 10.5, 2.56 - 4.01 and 2.3 - 10.1% rodent damage was accounted for groundnut, sorghum and pearl millet respectively in Gujarat. Of the ten pomegranate varieties screened against vertebrate pests, Jalore seedless and khog varieties registered comparatively less damage (10 - 17%).

A toxicant-cum-sterilant, alpha-chlorohydrin at 0.5% was found effective for the control of zinc phosphide baitshy *B. bengalensis*, which suffered 60% mortality. Of the 40% survivors, 10% males were permanently sterile. This chemical provided 67% control success in wheat crop fields.

Among the rodenticides, a tracking powder, racumin was reported to be a promising toxicant in the laboratory. In the field studies also 50-60% rodent control sucess was achieved. In a simulated study, it was noticed

that single run by *B. bengalensis* on racumin tracking powder yielded 80 kill of the rodents. Rodent management studies in poultry farms reveal that treatment of brodifacoum, bromadiolone, warfarin and zinc phosphi provided 65, 48, 43 and 41 per cent control success, respectively. On t other hand, regular trapping in the poultry farms could remove 51% populati of rodents in Karnataka region.

The freshly prepared baits of flocoumafen proved superior over rea to use wax cakes. However, manual throwing of bromadiolone cakes @ kg/ha in a grid pattern in sugarcane fields proved significantly effective. T rodent control success with one application of the wax cakes of bromadiolo was to the tune of 82.5% in the fruit orchards in Himachal Pradesh.

A small compact local burrow fumigator developed by APAU, Hyderaba Maruteru centre for the control of field rodents was also evaluated furth Fumigation of burrows yielded cent percent rodent control sucess in t rice fields in Andhra Pradesh. Weeds, paddy straw etc. were utilised f fumigation.

The Social Engineering Activity, a novel concept of AICRP on Rode Control was also implemented quite effectively at several centres which h paid rich dividends in terms of creation of awareness about rodent contr among the farming community.

FELICITATIONS TO DR. V.P. MITTAL

The Eighth Group Meeting of AICRP on Rodent Control felicitated Dr. V.P. Mittal, former Professor & Head, Dept. of Entomology, GAU, Junagadh on 30.12.1994. Dr. Mittal was the Principal Investigator of GAU, Junagadh Cooperating Centre of the AICRP on Rodent Control since its inception and provided newer dimensions to rodent research and extension in Gujarat. He retired from the Govt. service on 28.2.1994. The Editorial Board and Rodent Newsletter family whishes a long, healthy, happy & prosperous life to Dr. Mittal.

Research Programmes Allotted to the AICRP Centres for Next Two Years

A. Common to all the centres

RM 1 : Survey and monitoring of rodent pests in different agro- climatic zones.

RM 2 : Evaluation of acceptability and bioefficacy of rodenticides.

RM 3 : Assessment of extent of rodent damage to major crops of the area.

RM 4 : Social engineering activity on rodent control.

B. Location specific programmes

1. CAZRI, Jodhpur

RMLS 1 : Basic behavioural patterns of desert rodents.

RMLS 2 : Rodent Management on the basis of exudates / secretions and chemocommunication.

RMLS 3 : Rodent management in arid horticulture, rangelands and sand dune stabilisation sites.

2. PAU, Ludhiana

RMLS 1 : Behavioural ecology of rodents.

RMLS 2 : Resiliency management in rodent population with genetic and reproductive control.

3. USA, Bangalore

RMLS 1 : Rodent pest management in citrus, guava, cardamom, and coconut crops in collaboration with IIHR, Bangalore.

RMLS 2 : Mitigation of bait shyness methods other than pheromones.

4. IISR, Lucknow

RMLS 1 : Studies on migration of *Bandicota bengalensis* from crop fields to residential premises.

RMLS 2 : Rodent pest management in poultry farms.

5. ICAR (NEH), Shillong

RMLS 1 : Evolving rodent management techniques for terrace cultivation jhum cultivation and for residential premises in NEH Region

RMLS 2 : Reproductive biology of major rodent pests.

6. APAU, Maruteru

RMLS 1 : Reproductive cyclicity of major rodent pests in rice and other crops.

RMLS 2 : Rodent management in plantation crops.

7. JNKVV, Jabalpur

RMLS 1 : Assessment of rodent damage in poatato, tomato and chillies.

RMLS 2 : Developing schedule for rodent pest management in soybean, jowar, pulse and oilseed crops.

RMLS 3 : Biology and population ecology of major rodent pest species.

8. GAU, Junagadh

RMLS 1 : Developing strategies for rodent management in groundnut, wheat and cucurbits.

RMLS 2 : Rodent management in poultry forms.

9. Dr. YSPU H&F, Solan

RMLS 1 : Rodent pest management in vegetable crops and fruit orchards of apple, peach, plum, pecan etc.

RMLS 2 : Reproductive biology of major rodent pests.

HOUSE RAT MENACE IN HOSTEL

Recently, in a month time we received eight complaints from our college and polytechnic hostel inmates that their soles were gnawed by the rodents when they were sleeping in their rooms. Of the eight in one case the inmate's sole had been gnawed by the rat upto 1 cm depth. Later, the visiting rat was trapped with the help of a sherman traps and identified as house rat, *Rattus rattus*. (By P. Neelnarayanan, R. Nagarajan and R. Kanakasabai AVC College, Mayiladuthurai 609305 Tamil Nadu)

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

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