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Dr T. P. Rajendran, ADG(PP) addressing the delegates



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CONTENTS

1. Rodents (Mammalia: Rodentia) of Andaman and Nicobar Islands with notes on their Conservation and Management
- **R. Chakraborty and S. Chakraborty** 1
2. National Plan on Rodent Pest Management: Current initiative of Govt of India
- **A.M.K. Mohan Rao** 9
3. Bio-ecology and response of squirrels to trapping and chemicals in fragmented cardamom plantations of Western Ghats of Karnataka
- **A.K. Chakravarthy, K.R. Yathish and Shakunthala Sridhara** 12
4. Acceptance and efficacy of bait containing papaya seed powder against male *Rattus rattus*
- **Neena Singla and B.K. Babbar** 13
6. Notes and News 15

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

Rodents (Mammalia: Rodentia) of Andaman and Nicobar Islands with notes on their Conservation and Management

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Introduction: Since nineteenth century, scattered information on the rodent fauna of Andaman and Nicobar Islands were available, however, Miller (1902) for the first time provided a consolidated account of the mammalian species of these islands along with the description of a number of new rodent species. Ellerman (1961) in a revisionary work, being unable to examine specimens of many of the rodent species described from Andaman and Nicobar islands, maintained all of them. Later, few more species of exotic rodent have been recorded (Chaturvedi 1966a & b; Mandal and Ghosh, 1984). Recently, a lot of rodent species collected by Central Agricultural Research Institute (CARI) from Port Blair revealed the occurrence of Indian Field Mouse, *Mus booduga*. Recent visit of one of the author to the islands, found the signs of invasion of the Lesser Bandicoot Rat, *Bandicota bengalensis* and Norway Rat, *Rattus norvegicus* in the port and market area of Port Blair. During the recent past, these islands faced a sea of changes with the influx of refugees who settled down from different parts of India and other neighbouring countries. To meet the demands of increased human population, arrival of cargos from the mainland as well as from one island to other has become a regular affair. Owing to small size and elusive nature, rodents are vulnerable of being transported along with these cargos. Further, due to extension of agriculture and to some extent industries, ecological scenarios of these islands are also changing. Many of the exotic species of these islands are very much invasive, having the potential to incur huge losses to agricultural crops and others along with the displacement of native forms. In the present compilation an attempt has been made to provide an account of the rodent species of Andaman and Nicobars, their synonyms, current nomenclature, distribution, conservation status and management.

Species Composition: Most of the rodent species reported in existing literature were described on the basis of some average characters of one

or few specimens. Towards the end of the 20th century various revisionary works have shown that many of them are conspecific to some mainland forms or other already existing species from this group of islands (Saha, 1980; Chaturvedi 1980; Musser and Heaney, 1985; Musser 1986; Agrawal, 2000 and Pradhan and Talmale 2009). Based on these reports and field observation of one of the present authors, a list of valid rodent species from Andaman and Nicobar Islands along with their synonyms and distribution has been provided in Table 1.

Table 1. Current rodent species composition of Andaman and Nikobar Islands

Sl. No.	Scientific Name with synonyms	Common Name	Distribution
FAMILY: MURIDAE			
1.	<i>Mus musculus</i>	House Mouse	Throughout
2.	<i>Mus cervicolor</i>	Fawn Coloured Mouse	Throughout (?)
3.	<i>Mus booduga</i>	Common Indian Field Mouse	Middle Andaman
4.	<i>Rattus stoicus</i> Synonym: <i>Taciturnus rogersi</i>	Andaman Archipelago Rat	South Andaman, Little Andaman, Henry Lawrence
5.	<i>Rattus rattus</i> Synonym: <i>atratus, atridorsum, alexandrianus</i>	Roof Rat	Throughout
6.	<i>Rattus tanezumi</i> Synonym: <i>pulliventer</i>	Oriental House Rat	Great Nicobar, Middle Andaman
7.	<i>Rattus burrus</i> Synonym: <i>burrescens</i>	Nicobar Archipelago Rat	Trincat, Little Nicobar, Great Nicobar
8.	<i>Rattus palmarum</i> Synonym: <i>novarae</i>	Car Nicobar Rat	Great Nicobar, Trincat, Henry Lawrence, South Andaman
9.	<i>Rattus andamanensis</i> Synonym: <i>Burrus flebilis, holchu</i>	Indo-Chinese Forest Rat	Andaman islands, Barren, Narcondam, Interview, Long, Baratang, Car Nicobar, Henry Lawrence
10.	<i>Rattus norvegicus</i>	Norway rat	Middle Andaman
11.	<i>Bandicota bengalensis</i>	Lesser Bandicoot Rat	Middle Andaman
FAMILY: SCIURIDAE			
12.	<i>Funambulus pennanti</i>	Northern Palm Squirrel	Trincat, Great Nicobar

Out of twelve species, three (*Rattus stoicus*, *R. palmarum* and *R. burrus*) are endemic to Andaman and Nicobar islands only while rest nine species are exotic, arriving from the mainlands, probably through transportation by human agencies. *Rattus andamanensis* though first described from South Andaman, is extensively distributed in the hilly

regions of Nepal, Sikkim, Arunachal Pradesh, Meghalaya and West Bengal. Arrival of *Bandicota bengalensis* in the islands is the most alarming one. By virtue of its great adaptability and aggressive nature, the lesser bandicoots have gradually established in various ecological regions even in arid and semiarid zones and NEH regions etc. by replacement of the local forms. Thus, the current species composition and population trends of the already existing rodent species in the islands may be altered by the invasion of *B. bengalensis*.

Identification: Diagnostic characters of the rodent species of these islands is briefed as under,

1. *Mus musculus* Linnaeus: A small mouse; tail little longer than head and body (HB); dorsum sandy brown to dark brown, and venter white to ochraceous brown; tail (T) faintly bicoloured, dark above and white below and hind foot (HF) either white or cinnamon; Mammae: 5 pairs (HB: 55-94 mm; T:64-99 mm; HF: 12-19 mm; Ear: 11-15 mm).

2. *Mus booduga* (Gray): A small, soft-furred mouse, having a bicoloured tail, darker above and paler below and equal or shorter than head and body length; dorsum varies from light sandy or light grey to dark reddish or rusty brown; venter perfectly white, greyish white or grey, depending upon individual hair being white up to base, grey on basal half and white at tip or completely grey; Mammae 5 pairs (HB: 52-87 mm; T: 51-72 mm; HF: 13-17 mm).

3. *Mus cervicolor* Hodgson : A soft furred mouse, larger than *M. booduga* ; body dark brown above and greyish white on the undersurface; tail bicoloured, dark above and pale below, shorter than head and body length; hind foot whitish; Mammae 5 pairs (HB: 60-95 mm; T: 56-76 mm; HF:14-18 mm; Ear: 11-14 mm).

4. *Rattus rattus* (Linnaeus): A medium sized rat, having a completely unicoloured tail, generally longer than head and body length; fur short and harsh, with many soft, flattened spines in forms of the plains, and soft without spines at least in winter of the montane forms; dorsum in various shades of brown; venter usually white or cream with a medial streak of grey or irregular grey patches or greyish, tipped with buff; Mammae generally 5 pairs, if 6th pair present, then post axial pairs close together; 2n = 38/40 (HB:116-203 mm; T: 159-256 mm; HF:26-36 mm; Ear:21-28 mm).

5. *Rattus stoicus* (Miller): A large heavily built rat, having the tail much shorter than head and body; hind foot long, studded with prominent

claws; fur coarse and spinous; dorsum greyish brown; venter grey; tail faintly bicoloured; hind foot greyish brown; soles naked with six plantar pads; Mammae 4 pairs (HB: 220-260 mm; T: 192-212 mm; HF:45-48 mm).

Remarks: According to Miller (1902), this species resembles much with *Rattus palmarum*.

6. *Rattus palmarum* (Jelebor): A large rat, having the tail much shorter than head and body; hind foot long; fur coarse and spinous; dorsum dark brown; venter white; tail wholly dark. Mammae 5 pairs. HB 275 mm; T: 215; Hf 48 mm (Holotype).

7. *Rattus burrus* (Miller): A large rat, having the tail subequal to head and body length; hind foot long; fur spine less and soft; dorsum, fine grizzle of dark brown or russet in colour; venter light buff or creamy; hind foot brown; tail uniformly dark brown; Mammae 5 pairs (HB: 215 mm; T: 215 mm; HF: 41mm).

8. *Rattus tanezumi* Temminck: Body slim; tail usually shorter than head and body but may be little larger; hind foot small; fur densely spinous; dorsum brown; under parts drab or dusky, may lightly be tinged with russet; Mammae 5 pairs, exceptionally 4 or 6. 2n = 42.

9. *Rattus andamanensis* (Blyth): The appearance is much similar to *R. Rattus*; fur often but not invariably spinous; venter light cream buff sharply contrasted with brown of sides; tail slightly longer than head and body; total length 360-397 mm (HB: 160-188 mm; T: 137-212 mm; HF: 37-39 mm).

10. *Rattus norvegicus* (Berkenhout) : A large rat, having an obscurely bicoloured tail, shorter than head and body (80-95%); ears small; fur coarse and spiny; dorsum dark brown and venter grey; Mammae 5/ 6 pairs (HB: 205-250 mm; T: 183-213 mm; HF: 37-47 mm; Ear: 16-24 mm).

11. *Bandicota bengalensis* (Gray) : Robust body; tail shorter than head and body; ears almost round in outline; pelage short and harsh, rarely soft; dorsum greyish brown to black, occasionally with a reddish hue; venter light to dark grey; tail dark and unicoloured; hind foot brown. Mammae 6-8 pairs (HB: 130-261mm; T: 99-202mm; HF: 27-48 mm).

12. *Funumbulus pennanti* Wroughton: Dorsal colour olive gray, divided by three even coloured longitudinal stripes; belly and flanks creamy gray, separated from dorsum by indistinct longitudinal creamy-buff stripes; tail bushy with creamy or whitish tip.

Conservation Status: According to IUCN Red List Categories and Criteria version 3.1, the conservation status of South Asian Non-Volant small mammals were assessed during CAMP workshop (Molur *et al.*, 2005). Findings of CAMP workshop as regards the rodents of Andaman and Nicobar Islands are summarized in Table 2. At the CAMP workshop, *R. andamanensis* was considered as a synonym of *R. tanezumii*. As such status of *R. andamanensis* was not evaluated. Later, Musser and Carleton (2005) treated *R. andamanensis* as a distinct species and placed it under 'Vulnerable' category of IUCN.

Table 2. IUCN Conservation Status of rodent species from Andaman and Nicobar Islands

Sl.No.	Name of the Species	Conservation Status
1.	<i>M. musculus</i>	Least concerned
2.	<i>M. cervicolor</i>	Least concerned
3.	<i>M. booduga</i>	Least concerned
4.	<i>R. rattus</i>	Least concerned
5.	<i>B. bengalensis</i>	Least concerned
6.	<i>F. pennantii</i>	Least concerned
7.	<i>R. stoicus</i>	Vulnerable
8.	<i>R. burrus</i>	Endangered
9.	<i>R. palmarum</i>	Critically Endangered
10.	<i>R. tanezumii</i>	Not Evaluated
11.	<i>R. norvegicus</i>	Not Evaluated
12.	<i>R. andamanensis</i>	Not Evaluated

Management and Conservation: Islands are one of the most sensitive and fragile ecosystems. Slightest introduced change in the biotic and abiotic components may totally destroy the ecosystem. In fact, a long range of vertebrate and invertebrate exotics in these islands are indicating a serious threat to the long term survival of the forest and its biota (Pal 2006). Analysis of the rodent species composition reveals that a number of serious rodent pest species including *B. bengalensis* are already established in these islands. However, significant role of rodents in the ecosystem should also be taken into consideration because rodents play a very crucial role in the ecosystem. They are very essential as they sustain predators of various sizes and kinds and even provide protein for human beings in some communities. They also disperse seeds creating new growth and spread of vegetation. They prevent congestion of crucial areas such as water ways. Further at least four rodent species of the islands are threatened and three of them are endemic. In the context of convention on Biological diversity (1992), special value has been added to each and every endemic

species of the country. Any economic value or other potential of the endemic species are the sovereign right of the country of origin. Thus loss of a non target species may not only destroy the fragile island ecosystem, but also incur the damage of the national biodiversity resources. Existing knowledge about the species identification, population, ecological distribution, extent of damage and other related aspects in island ecosystem is far from the complete. Thus rodent management practice in the islands should be designed with much care in an eco-friendly manner. Ethno zoological studies for scientific evaluation of the local traditional knowledge about the utilization and management of rodent species are important. Trapping, watering, barricading, scientific farming, proper housekeeping, awareness programme, research, training and extension are some important eco-friendly management tools. As the invasive exotic species from the mainland have the potential to drive away the local endemic and threatened species, special vigilance are to be arranged at all the entry points, specially at the sea ports and its neighbouring markets, storehouse, sewerage system *etc.* In this regard port and other local authorities should be taken into confidence. It is to be noted that except *Mus cervicolor*, all the least concern species have been identified as major rodent pest species of India.

Conclusion: No doubt that quite a number of rodent species have been reported from Andaman and Nicobar Islands, however, till date, no systematic survey with special reference to rodents was conducted in this group of islands. Systematic surveys will not only help to resolve the disputes as regard the taxonomic status of different species but also generate valuable information on identification, ecological distribution, status of different species and their relative abundance, pestiferous species *etc.* These base line data will help the managers in determining the priorities of research and action plan, with least damage to the existing ecosystems and the threatened species of the different islands. In this connection, collaboration between Zoological Survey of India and all India Network Project on Rodent Control will play a crucial role to achieve the goal of conservation and management of rodent species in Andaman and Nicobar Islands.

References

- Agrawal, V.C. 2000. Taxonomic studies on Muridae and Hystricidae (Mammalia : Rodentia). *Rec. Zool. Surv. India, Occ. Paper*, no. 180. 177pp.
- Chaturvedi, Y. 1966a. A new house rat (Mammalia : Rodentia : Muridae) from the Andaman and Nicobar Islands. *Proc. Zool. Soc. Calcutta*, 19 : 141-144.

National Plan on Rodent Pest Management: Current initiative of Govt of India

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Rodents play a vital negative role in agriculture and health sectors. In order to bring food and health security for the Nation, it has become essential to encourage rodent management at farm as well as storage levels. As a strategy, Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Government of India has initiated a National Plan on Rodent Pest Management to make operational programmes through DAC and Indian Council of Agricultural Research during XI Plan period. The major intervention in the *National Plan* is awareness creation and capacity building on role played by rodent pests/vectors in agriculture and health sectors to facilitate various stakeholders involved in food production (farming community and Private industry), commodity storage and other industries to take up appropriate and timely management actions.

The Plan is to be implemented through National Institute of Plant Health Management (NIPHM), Hyderabad as nodal institution and technically supported by ICAR sponsored All India Network Project on Rodent Control, Central Arid Zone Research Institute, Jodhpur.

Objectives: The ultimate objective of the National Plan is to create awareness among the farming community to take up timely and appropriate rodent management operations with community involvement as a regular agricultural practice. However, the Plan is following a three pronged approach i.e., capacity building, awareness creation and actual rodent management.

I. Capacity Building: There is great paucity of trained manpower on rodent management. To implement such a scheme at National level covering crop fields, rural and urban houses, godowns, storage, commercial establishments, public places and CPRs, it requires massive trained manpower. Therefore the capacity building activity would be taken up at different levels.

i) At academic level: Science of vertebrate pests, wherein rodents are a part and their management needs sharper knowledge development at academic levels in Agriculture polytechnics and under graduate and Post-graduate curricula in Universities. Greater emphasis need to be given to

Chaturvedi, Y. 1966b. Occurrence of the Northern Palm Squirrel, *Funambulus pennanti* Wroughton, in the Andamans. *J. Bombay nat. Hist. Soc.*, 62 : 545-546.

Chaturvedi, Y. 1980. Mammals of the Andamans and Nicobars : Their zoogeography and faunal affinity. *Rec. Zool. Surv. India*, 77 : 127-139.

Ellerman, J.R. 1961. *The Fauna of India including Pakistan, Burma and Ceylon. Mammalia*. Vol. 3. Manager of Publications, Govt. of India, Calcutta. 884.

Mandal, A. K. and Ghosh, M.K. 1984. Report on the occurrence of *Mus cervicolor* in the Andaman and Nicobar Islands. *J. Bombay nat. Hist. Soc.*, 81 : 465-466.

Miller, G.S. 1902. The mammals of the Andaman and Nicobar Islands. *Proc. U.S. nat. Mus. Washington*, 24 : 751-795.

Molur, S., Srinivasalu, C., Srinivasalu, B., Walker, S., Nameer, O.P. and Ravikumar, L. 2005. Status of South Asian Non-Volant Small Mammals : CAMP Ws. Repopr. Zoo/CBSG. Coimbatore, India.

Musser, G. 1986. Sundaic *Rattus*: Definitions of *Rattus baluensis* and *Rattus korinchi*. *American Museum Novitates*, 2862 : 1-24.

Musser, G. and Carleton, M.D. 2005. Order Rodentia in Mammal species of the world : a taxonomic and geographic reference by Wilson, D.E. & Reeder Dee Ann (2005).

Musser, G. and Heaney, L.R. 1985. Philippine *Rattus*: A new species of the Sulu Archipelago. *American Museum Novitates*, 2818 : 1-32.

Musser, G. and Newcomb, C. 1983. Malaysian murids and the giant rat of Sumatra. *Bull. Am. Mus. Nat. Hist.*, 174 : 327-598.

Pal, T.K. 2006. Consequence of human interference on bio-resources in 'Environmental awareness and Wildlife Conservation' (ed. Basu, R.C., Khan, R.A. and Alfred, J.R.B.), pp. 157-178. ZSI, Kolkata.

Pradhan, M.S. and Talmale, S.S. 2009. A checklist of Valid Indian Rodent Taxa (Mammalia : Rodentia). ZSI, Kolkata.

Saha, S.S. 1980. Notes on some mammals recently collected from Andaman and Nicobar Islands. *Rec.zool. Surv. India*, 77 : 119-126.

the internship at the graduate level so as to provide graduates with field based experience in rodent management. Inclusion of a management module at both the UG and PG level is essential for a long term impact. Course curricula need to be extensively revised so as to incorporate the requirement of vertebrate pest management in India. Hence, Curriculum Development Workshops of 3-day duration will be conducted. Academic staff will be trained during the Plan period with a 5 day duration refresher training programs by NIPHM and AINP on Rodent Control.

ii) At policy level: It is proposed to organize sensitization workshops highlighting role of rodents on their losses in agriculture and storage as well as in transmitting rodent borne diseases. Policy makers at state/organization level, particularly in Agriculture, Horticulture and Public health sectors will be given exposures on the subject in addition to suitable planning processes to contain these problems. The NIPHM, Hyderabad will be organizing such workshops twice a year.

iii) At extension level: Sustained Capacity Building of extension functionaries will be taken up for appropriate technology transfer. The training and education component will be as under:

- **Apex Level Trainings:** As the term apex level indicates, this type of training will be organized for all senior level extension functionaries of Departments of Agriculture, Horticulture, Health, Forests etc who are involved in organizing and monitoring large scale rodent control campaigns. This 3-day training provides exposures on management of different factors for molding the attitude of common people towards rodent management
- **Middle Level Trainings:** It is a master trainers training programme for middle level extension functionaries of Government departments, scientists of KVKs, private industry and voluntary organizations. The 7 day long training covers aspects related to ecology, biology and management of rodent pests including procurement of inputs like poisons, baits, traps etc. NIPHM and AINP on Rodent Control will extend their expertise as per requirement.
- **In situ Field Level Trainings:** In order to promote Farmer level participation in rodent management as a regular agricultural practice, progressive farmers identified from each commodity group will be trained in major commodity/ enterprise through Farmers' Field Schools (FFS). Each farm school will be organized in the blocks identified for undertaking rodent control campaigns. The Trainer Farmers will be

the resource persons for these FFS in the endemic areas of the country. During the FFS, demonstrations on rodent incidence, their buildup in the season, vulnerable crop stage, proven technologies will be given on participatory basis. Action oriented research trials will also be undertaken to make the farmer participants strong in their conviction on rodent problem and management. This trained contingent will be helpful in coordinating village level rodent control campaigns. This 5-day operational Trainer farmer training will have skill oriented field based program in all the problem Districts.

2. Awareness creation: Farmer-to-farmer learning and technology transfer is the most reliable approach among extension services and training is a key input for human resource development. Leaflets, video films and other publicity materials on rodent pest management are to be developed as per local situation for giving wide publicity.

- **Education:** If the enormous losses caused by rodents to the food and health in general are brought to the notice of farmers and common man, awareness would be created on rodent related problems. This can be achieved if Radio, T.V. and print media are utilized on a larger scale through advertisements, interviews, talks etc. Similarly leaflets may be prepared in local languages for distribution. Once thinking against rodents is created, the programmes incorporating management technology may be effectively popularized.
- **Media and Publicity:** Mass Media and Information & Communication Technology (MM&ICT) should specially address these needs of small and marginal farmers. The services of Kisan Call centers may also be used, which respond to the issues raised by farmers instantly in the local language on a continuous basis. Community radio is a vibrant community broadcasting system to enhance pluralism and diversity by understanding the needs of the users. Hence efforts are needed to involve community radio centers to provide location specific information on rodents and their management to the farming community.

3. Rodent Management campaigns: Rodent management campaigns in endemic blocks would be taken up during the Plan period in identified states, which have rodent endemic pockets. In each state, endemic districts will be identified and all HRD activities will be taken up as stated above. Majority of the rodent management technology claims are in fact protocols/ techniques, which have not been adequately scaled up, or properly validated on large scale. Hence technology validation would also be taken up before organizing the campaigns.

4. Plan Schedule: Both long term and short term planning is essential to bring effective results. The long term planning includes inclusion/revision of curricula at different levels for capacity building activities; involvement of agencies to create awareness on rodent pest management. As far as short term measures are concerned the endemic areas with serious rodent problems would be covered on priority in the remaining part of XI Plan period to bring down rodent damage levels to around 2-3%. Latter on other areas would be taken up for periodic operations.

Bio-ecology and response of squirrels to trapping and chemicals in fragmented cardamom plantations of Western Ghats of Karnataka

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Field and laboratory studies were conducted from 1985 to 2005 on rodent community associated with the 'Queen of spices' - the cardamom (*Elettaria cardamomum*) plantations in Western Ghats of Karnataka embracing eight districts. Present communication forms a part of the findings on bio-ecology and habitat preference of squirrels, *Funambulus palmarum*. Breeding in squirrels occurred during reproductive (August-January) growth phase of cardamom plant when a significant drop in the territory overlapping and social interactions ensued. A strict territoriality between nesting pairs occurred. Vocalization and agonistic displays in the contiguous areas of two breeding females increased. During the cardamom reproductive phase alone that *F. palmarum* squirrels restricted all activities within the cardamom plantations. Foraging in fragmented cardamom patches followed an ideal free distribution for the squirrels indicating that every individual foraging in cardamom plantations will have equal chance to exploit the available food resources in the ecosystem.

Based on habitat suitability index (HSI) the valleys were most preferred over slopes and plains for foraging, feeding and nesting of squirrels. However, maximum cardamom yield loss was observed in the plains and valleys than the slopes. Studies further indicated that squirrel damage to cardamom varied from habitat to habitat in a region. The Malabar type cardamom received the maximum rodent damage to capsules as compared to the Vazhukka and Mysore types (Table 1).

Table 1. Rodent damage to cardamom capsules in relation to the plant types

Month	Cardamom types	Capsule damage (%)
July	Malabar	22
	Vazhukka	0
	Mysore	0
August	Malabar	94
	Vazhukka	11
	Mysore	0
September	Malabar	45
	Vazhukka	26
	Mysore	0

F. palmarum was the most abundant *Funambulus* sp followed by *F. pennanti* > *F. tristriatus* > *F. sublineatus* > *F. layardii* in the study area. *F. palmarum* and *F. pennanti* are less impacted by fragmentation of cardamom orchards than *F. tristriatus*, *F. sublineatus* and *F. layardii*. Locally made wooden snap traps baited with germinating paddy seeds significantly reduced capsule damage as compared to non-trap area. However, the impact of trapping remained effective only for 7-10 days due to faster immigration of rodents. When squirrels were managed by trapping (wooden snap traps), damage by other rodents (mainly *Mus booduga*, *Bandicota bengalensis* and *B. indica*) increased and when these were also controlled by trapping in a cardamom patch, ground birds like thrushes, dominated as cardamom capsule depredators. Eco-friendly crop protection measures, viz., overlapping panicles, trapping with wooden snap traps, timely harvests of cardamom capsules and regular weeding afforded sustainable protection to cardamom capsule from rodents. These practices are also crucial from the stand point of biodiversity conservation and sustainable yields.

Acceptance and efficacy of bait containing papaya seed powder against male *Rattus rattus*

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A preliminary experiment was conducted to evaluate the acceptance and efficacy of bait containing 2% papaya seed powder against male house rats, *Rattus rattus* in laboratory. Mature and healthy male rats (n = 10) trapped from the poultry farms were acclimatized to laboratory conditions for 10-15 days prior to experimentation. Rats were divided into two groups (I and II) of five each. Before the commencement of experiment, a pre-treatment consumption of WSO mix (wheat, sugar, oil

in 96:2:2) bait by rats of both the groups was recorded daily for 4 days. During treatment, one group (I) of treated rats was offered WSO mix bait containing 2% papaya seed powder in no-choice feeding test for 10 days. Other group (II) was kept as untreated control and was fed on plain WSO. Mean daily consumption of food was converted in g/100g bait for comparison. From the total treated bait consumed by treated group in 10 days, dose of the active ingredient (papaya seed powder) ingested was also calculated as g/Kg body weight (bwt). After the treatment the rats were observed for mortality and other clinical symptoms. After 30 days of termination of treatment, all the treated and untreated rats were weighed, anaesthetized and sacrificed to record male antifertility effects of papaya seed powder.

The study revealed no significant difference between the consumptions of treated and untreated food by male *R. rattus* (Table 1) indicating fairly good acceptability and palatability of papaya seed powder treated food. The weights of testis and epididymis, sperm motility, viability and density were found to be reduced significantly ($P=0.01$) in treated rats to the extent that 60% of the treated rats showed 0% sperm motility and viability. Remaining 40% of the treated rats had aspermia in the cauda epididymal fluid. Up to 30% head tail separation of the spermatozoa was also reported in treated rats. The results therefore indicate that papaya seed powder (@2%) in baits possesses male anti fertility potential, however detailed studies are required to determine the exact concentration and duration of treatment for population regulation of *R. rattus*.

Table 1. Acceptance and efficacy of bait containing 2% papaya seed powder against male house rats, *Rattus rattus* under no-choice conditions

S.No.	Parameters	Treated group I (n=5)	Untreated group II (n=5)
1.	Initial body wt (g)	147.00 ± 3.74	140.00 ± 4.18
2.	Pre-treatment consumption of food (g/100g bw)	8.44 ± 1.07	9.17 ± 0.72
3.	During treatment consumption of food (g/100g bw)	9.94 ± 0.57	9.40 ± 0.30
4.	Acceptance of treated bait over untreated bait (%)	125.78 ± 18.10	-
5.	Total dose of active ingredient ingested (g/Kg bw)	19.89 ± 1.13	-
6.	Body wt after 30 days of end of treatment (g)	162.00 ± 8.15	149.60 ± 3.56
7.	Wt. of testes (g/100 bw)	0.36 ± 0.03*	0.67 ± 0.03
8.	Wt. of caput epididymis (g/100 bw)	0.08 ± 0.005*	0.10 ± 0.002
9.	Wt. of cauda epididymis (g/100 bw)	0.10 ± 0.01*	0.16 ± 0.01
10.	Wt. of seminal vesicles (g/100 bw)	0.45 ± 0.07	0.46 ± 0.01
11.	Sperm motility (%)	12.00 ± 9.69*	68.00 ± 12.75
12.	Sperm viability (%)	14.00 ± 11.66*	76.00 ± 1.87
13.	Sperm density (millions/ml)	7.00 ± 6.02*	253.00 ± 10.44
14.	Sperm head tail separation (% range)	10-30	Nil

* Significant differences from untreated rats at $P=0.01$

All India Group Meeting On Rodent Control: Fourteenth Group Meeting of All India Network Project on Rodent was organized at Central Agricultural Research Institute, Port Blair from 19-21 March 2010. During the inaugural session Dr. T.P. Rajendran, ADG (PP), ICAR, New Delhi appreciated the progress achieved by the project in the development of rodent management technologies. He informed that a Department of Agriculture and Cooperation (Govt of India) is initiating a National Plan on Rodent Pest Management, where AINP on Rodent Control will be collaborating with National Institute of Plant Health Management, Hyderabad in capacity building and popularization of rodent management technologies through out the country. He commended the efforts of rodent scientists in blending modern knowledge with traditionality and creating awareness among farmers of NEH region to mitigate the rodent problem during gregarious bamboo flowering periods. Dr R.C. Srivastava, Director CARI, Port Blair in his remarks said that the Andaman & Nicobar Islands are practically unexplored as far as ecology and management of rodent was concerned. He thanked ICAR for bringing CARI, Port Blair in the Network Programme and assured that the center will strive hard in developing region specific technologies. Chief Guest, Dr P. Vijayachari, Director, Regional Medical Research Center (ICMR), Port Blair highlighted the role of rodents as vectors of several zoonotic diseases and desired to have collaborative programmes between medical and agricultural scientists in managing the rodents for food and health security. On this occasion bulletins on "The larger Bandicoot rat, *Bandicota indica*" and "Rodents and their management in Andaman and Nicobar Islands" were also released by honourable guests.

The highlight of the Group Meeting was a session on Special lectures on (i) Leptospirosis: A Rodent borne zoonotic disease (Dr P. Vjayachari, RMRC, Port Blair) (ii) Rodent faunal diversity in Andaman and Nicobar Islands (Dr Rina Chakraborty, ZSI, Kolkata) (iii) Rodent Problem at International Seaports and International Health Regulations (Dr S. Biswas, NICD, Bangalore) (iv) Rodent Pest Management: Current initiatives of Deptt of Agriculture & Cooperation Govt of India (Dr AMK Mohan Rao, NIPHM, Hyderabad) (v) Spatial distribution of birds using GIS/GPS tools (Dr. V. Vasudeva Rao, ANGRAU, Hyderabad) and (vi) Changing scenario of Rodent Pests in India (Dr. R. S. Tripathi, CAZRI, Jodhpur).

Apex Level Training on Rodent Pest Management at Maruteru :

Twenty fourth Apex Level Training on Rodent Pest Management was jointly organized by AINP on Rodent Control, ANG Ranga Agricultural University (ANGRAU) in collaboration with National Institute of Plant Health Management (NIPHM), Hyderabad at Andhra Pradesh Rice Research Institute & Regional Agricultural Research Station (APRRI & RARS), Maruteru from February 17-19, 2010. A total of 21 trainees from four states, Andhra Pradesh (18), Tamil Nadu (1) and Maharashtra (2) representing various organizations like, Central Warehousing Corporation, ANGRAU, Haffkine Institute for Training, Research & Testing, Mumbai and Department of Agriculture Andhra Pradesh and Tamil Nadu participated in the Programme. The resource persons included Dr. R. S. Tripathi, Project Coordinator, CAZRI, Jodhpur; Dr. A. M. K. Mohan Rao, Rodent Specialist and Dr. M. Nagadeve, Asst. Director (Comm.), NIPHM, Hyderabad; Dr S.M. Zaheeruddin (Former P.S. & PI), Sri M. Nanda Kishore and Dr N. Srinivas Rao, Scientists, AINP on Rodent Control, APRRI & RARS, Maruteru and Dr K. Malla Reddy, Dr. Sarup's Pest Control Pvt. Ltd, Hyderabad.

Workshop on Curriculum Development in Rodent Pest Management for Trainer farmers:

Workshop for developing curriculum on rodent pest management for Trainer Farmers was organized at National Institute on Plant Health Management, Hyderabad from December 8-10, 2010. 15 delegates representing AINP on Rodent Control and senior extension functionaries participated in the workshop. The workshop formulated a 5-day curricula to acquaint farmers about field, storage & health related rodent problems and their management.

National Training on Rodent Pest Management: As per the recommendations of Port Blair Group Meeting of AINP on Rodent Control a National Training on Rodent Pest Management was programs organized at NIPHM, Hyderabad from Dec 1-7, 2010. The 7-day programme was attended by eight scientists of ICAR/SAUs and nine senior level Extension functionaries from different states.

Apex Level Training on Rodent Pest Management at Maruteru (A.P.) (February 17-19,2010)



Dr. G. Laxmikantha Reddy, Director (R) addressing the participants



Field demonstration of Burrow Fumigator



Participants of Workshop on Curriculum Development for Trainer Farmers at Hyderabad (Dec 8-10,2010)

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

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