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All India Network Project On Rodent Control
Central Arid Zone Research Institute
Jodhpur - 342 003, India

Plate 1. Particoloured Flying Squirrel: *Hylopetes alboniger*
From: Namdapha National Park, Arunachal Pradesh.
Photo credits: C. Murali Krishna (Courtesy: Dr S.S. Talmale

Plate 2. Red Giant Flying Squirrel : *Petaurista petaurista*
From: Namdpaha National Park, Arunachal Pradesh.
Photo credits: Parimal C Ray. (Courtesy: Dr S.S. Talmale)

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Scuirid fauna (Order: Rodentia) of India

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Mammals are warm-blooded animals adapted to terrestrial, arboreal, aquatic and aerial mode of life. They are represented by 420 species under 191 genera belonging to 48 families grouped in 14 mammalian orders in India (Pradhan and Talmale, 2012). Rodentia is the largest order of mammals in the world comprising 2277 species in 481 genera under 33 families (Wilson and Reeder, 2005). The check list of Indian rodents prepared by us includes 103 species and 89 subspecies under 46 genera belonging to 7 families, representing about 25% of the total Indian mammal species. Family Scuridae (squirrels and marmots) is represented by 278 species under 51 genera in the world; however in India 27 species under 13 genera have been reported. It makes family scuridae the second most diverse rodent family (after Muridae) with 27 species in India. The systematic list of these Indian sciurid species with distribution within Indian limits is given here. *(Asterics) marks Indian endemic species.

Sub order : Sciuromorpha

(a) Family: Scuiridae Sub Family : Ratufinae

1. *Ratufa bicolor* (Sparrman, 1778)

Common Name: English: The large Malaya Squirrel, Black Giant Squirrel.

Distribution in India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Indian valid Subspecies: *Ratufa bicolor gigantea* (McClelland, 1839).

***2. *Ratufa indica* (Erxleben, 1777)**

Common Name: English: Indian Giant Squirrel, Malabar Squirrel; Hindi: Karrat, Rasu.

Distribution in India: Widely distributed in Peninsular India in Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa and Tamil Nadu.

Indian valid Subspecies: (i) *Ratufa indica indica* (Erxleben, 1777), (ii) *Ratufa indica centralis Ryley*, 1913, (iii) *Ratufa indica dealbata* (Blanford, 1897) and 4. *Ratufa indica maxima* (Schreber, 1784).

3. *Ratufa macroura* (Pennant, 1769)

Common Name: English: Sri Lankan Giant Squirrel, Grizzled Giant Indian Squirrel.

Distribution in India: Karnataka, Kerala and Tamil Nadu.

Indian valid Subspecies: *Ratufa macroura dandolena* Thomas and Wroughton, 1915.

(b) Family: Scuiridae Sub Family: Sciurinae Tribe: Pteromyini

4. *Belomys pearsonii* (Gray, 1842)

Common Name: English: Hairy-footed Flying Squirrel; Hindi: Udan Gilhari.

Distribution in India: Assam, Manipur, Mizoram, Nagaland, Sikkim and West Bengal.

Indian valid Subspecies: *Belomys pearsonii pearsonii* (Gray, 1842).

***5. *Biswamoyopterus biswasi* Saha, 1981**

Common Name: English: Namdapha Flying Squirrel; Hindi. Namdapha Udan Gilhari. Distribution in India: Known only from type locality, western slope, Patkai Range, Namdhapa, Arunachal Pradesh.

6. *Eoglaucomys fimbriatus* (Gray, 1837)

Common Name: English: Kashmir Flying Squirrel; Hindi: Kashmir Udan Gilhari.

Distribution in India: Himachal Pradesh, Jammu and Kashmir, Punjab east to Ranikhet, UP.

Indian valid Subspecies: (i) *Eoglaucomys fimbriatus fimbriatus* (Gray, 1837) and (ii) *Eoglaucomys fimbriatus baberi* (Blyth, 1847).

7. *Eupetaurus cinereus* Thomas, 1888

Common Name: English: Woolly Flying Squirrel; Hindi: Udan Gilhari.

Distribution in India: Gilgit (Kashmir) and Sikkim.

8. *Hylopetes alboniger* (Hodgson, 1836) (Plate 1)

Common Name: English: Particolored Flying Squirrel; Hindi: Udan Gilhari.

Distribution in India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Nagaland, Sikkim and West Bengal.

Indian valid Subspecies: *Hylopetes alboniger alboniger* (Hodgson, 1836).

9. *Petaurista elegans* (Müller, 1840)

Common Name: English: Spotted Giant Flying Squirrel; Hindi: Udan Gilhari.

Distribution in India: Sikkim and West Bengal.

Indian valid Subspecies: *Petaurista elegans caniceps* (Gray, 1842).

10. *Petaurista magnificus* (Hodgson, 1836)

Common Name: English: Hodgson's Giant Flying Squirrel; Hindi: Udan Gilhari.

Distribution in India: Darjiling (West Bengal), Sikkim.

11. *Petaurista nobilis* (Gray, 1842)

Common Name: English: Bhutan Giant Flying Squirrel; Hindi: Udan Gilhari.

Distribution in India: Darjiling (West Bengal), Sikkim.

Indian valid Subspecies: *Petaurista nobilis nobilis* (Gray, 1842).

12. *Petaurista petaurista* (Pallas, 1766) (Plate 2)

Common Name: English: Red Giant Flying Squirrel; Hindi: Udan Gilhari.

Distribution in India: Kashmir and Punjab east to Assam.

Indian valid Subspecies : *Petaurista petaurista albiventer* (Gray, 1834).

13. *Petaurista philippensis* (Elliot, 1839)

Common Name: English: Indian Giant Flying Squirrel; Hindi: Udan Gilhari.

Distribution in India: Bihar, Madhya Pradesh, Maharashtra, Orissa, Southern peninsula, Rajastan, Karnataka and Tamil Nadu.

Indian valid Subspecies: 1. *Petaurista philippensis philippensis* (Elliot,

1839) and 2. *Petaurista philippensis yunanensis* (Anderson, 1875).

14. *Petinomys fuscocapillus* (Jerdon, 1847)

Common Name: English: Travancore Flying Squirrel; Hindi: Udan Gilhari.

Distribution in India: Known only from Thiruananthapuram and Pelhavamthitta districts of Kerala.

(c)Family: Scuiridae Sub Family : Callosciurinae

15. *Callosciurus erythraeus* (Pallas, 1779)

Common Name: English: Pallas's Squirrel; Hindi: Gilhari.

Distribution in India: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura.

Indian valid Subspecies: 1. *Callosciurus erythraeus erythraeus* (Pallas, 1779), 2. *Callosciurus erythraeus erythrogaster* (Blyth, 1842) and 3. *Callosciurus erythraeus intermedius* (Anderson, 1879).

16. *Callosciurus pygerythrus* (I. Geoffroy Saint Hilaire, 1833)

Common Name: English: Irrawaddy Squirrel; Hindi: Gilhari.

Distribution in India: Arunachal Pradresh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and West Bengal.

Indian valid Subspecies: (i) *Callosciurus pygerythrus blythii* (Tytler, 1854), (ii) *Callosciurus pygerythrus lokroides* (Hodgson, 1836), (iii) *Callosciurus pygerythrus mearsi* (Bonhote, 1906) and (iv) *Callosciurus pygerythrus stevensi* (Thomas, 1908).

17. *Dremomys lokriah* (Hodgson, 1836)

Common Name: English: Orange-bellied Himalayan Squirrel; Hindi: Gilhari.

Distribution in India: Mountains in E India.

Indian valid Subspecies: (i) *Dremomys lokriah lokriah* (Hodgson, 1836), (ii) *Dremomys lokriah macmillani* Thomas and Wroughton, 1916 and (iii) *Dremomys lokriah garonum* Thomas, 1922.

18. *Dremomys pernyi* (Milne-Edwards, 1867)

Common Name: English: Perny's Long-nosed Squirrel; Hindi: Gilhari.

Distribution in India: Arunachal Pradesh, Assam, Manipur, Nagaland.

Indian valid Subspecies: *Dremomys pernyi howelli* Thomas, 1922.

19. *Dremomys rufigenis* (Blanford, 1878)

Common Name: English: Asian Red-cheeked Squirrel; Hindi: Gilhari.

Distribution in India: Arunachal Pradesh and Nagaland.

Indian valid Subspecies: *Dremomys rufigenis rufigenis* (Blanford, 1878).

20. *Funambulus (Funambulus) layardi* (Blyth, 1849)

Common Name: English: Layard's Palm Squirrel; Hindi: Gilhari.

Distribution in India: Kerala.

Indian valid Subspecies: *Funambulus (Funambulus) layardi dravidianus* Robinson, 1917.

21. *Funambulus (Funambulus) palmarum* (Linnaeus, 1766)

Common Name: English: Indian Palm Squirrel; Hindi: Gilhari.

Distribution in India: Andhra Pradesh, Chhattishgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Orissa and Tamil Nadu.

Indian valid Subspecies: (i) *Funambulus (Funambulus) palmarum palmarum* (Linnaeus, 1766) and (ii) *Funambulus (Funambulus) palmarum bellaricus* Wrought on, 1916

(iii) *Funambulus (Funambulus) palmarum robertsoni* Wroughton, 1916.

Remarks : Common pest of cocoa, arecanut, cashewnut, cardamom and coffee.

22. *Funambulus (Funambulus) sublineatus* (Waterhouse, 1838)

Common Name: English: Dusky Palm Squirrel; Hindi : Gilhari.

Distribution in India: Karnataka, Kerala and Tamil Nadu.

Indian valid Subspecies: *Funambulus (Funambulus) sublineatus sublineatus* (Waterhouse, 1838).

23. *Funambulus (Funambulus) tristriatus* (Waterhouse, 1837)

Common Name: English: Jungle Palm Squirrel; Hindi: Gilhari.

Distribution in India: Goa, Karnataka, Kerala, Maharashtra and Tamil Nadu.

Indian valid Subspecies: (i) *Funambulus (Funambulus) tristriatus tristriatus* (Waterhouse, 1837) and (ii) *Funambulus (Funambulus) tristriatus numarius* Wroughton, 1916.

Remarks: Pest of cocoa, cashewnut and arecanut.

24. *Funambulus (Prasadsciurus) pennanti* Wroughton, 1905

Common Name: English: Northern Palm Squirrel; Hindi: Gilhari.

Distribution in India: Andhra Pradesh, Bihar, Gujarat, Rajasthan, Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Uttaranchal, Uttar Pradesh and West Bengal states. Introduced in Andaman Isls.

Indian valid Subspecies: (i) *Funambulus pennanti pennanti* Wroughton, 1905; (ii) *Funambulus pennanti argentescens* Wroughton, 1905; (iii) *Funambulus pennanti chhattisgarhi* Ghose *et al.*, 2004 and (iv) *Funambulus pennanti gangutrianus* Ghose *et al.*, 2004.

Remarks: Common pest of fruit and vegetable crops.

25. *Tamiops macclellandi* (Horsfield, 1840)

Common Name: English: Himalayan Striped Squirrel; Hindi: Gilhari.

Distribution in India: Arunachal Pradesh, Assam, Manipur, Mizoram, Nagaland and Sikkim.

Indian valid Subspecies: *Tamiops macclellandii macclellandii* (Horsfield, 1840)

(d) Family: Scuiridae Sub Family: Xerinae Tribe: Marmotini

26. *Marmota (Marmota) caudata* (Geoffroy, 1844)

Common Name: English: Long-tailed Marmot, Kashmiri Marmot, Red Marmot.

Distribution in India: Kashmir.

Indian valid Subspecies: (i) *Marmota (Marmota) caudata caudata* (Geoffroy, 1844) and (ii) *Marmota (Marmota) caudata aurea* (Blanford, 1875).

27. *Marmota (Marmota) himalayana* (Hodgson, 1841) (Plate 3)

Common Name: English: Himalayan Marmot, Eastern Himalayan Marmot.

Distribution in India: Montane regions of N India to Ladakh.

Indian valid Subspecies: *Marmota (Marmota) himalayana himalayana* (Hodgson, 1841).

Management of rodents in vegetable soybean

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Soybean (*Glycine max*), otherwise known as a 'miracle crop' with over 40 per cent protein and 20 per cent oil, has its origin in China. More than 200 species have been reported as pests of soybean worldwide, including birds and rodents. Rodents attack soybean most often immediately after planting. Various estimates of damage due to rodent attack in soybean indicates loss ranging between 44 -70 kg /ha. In the present study, a non replicated field trail was conducted to test various rodenticides in soybean crop during Kharif 2010 at GKVK farm of University of Agricultural Sciences, Bangalore. A field trial with three different rodenticidal treatments namely, zinc phosphide (2%) an acute rodenticide and two anticoagulant rodenticides viz., brodifacoum (0.005%), bromodiolone (0.005 %) and one mechanical treatment (snap traps) along with untreated control were laid at pod formation stage in soybean crop for their efficacy in managing rodents. A 2.5 ha area was earmarked for each treatment. Live burrow counts were taken before and after the treatments. The predominant rodent species damaging soybean were *Bandicota bengalensis*, *Rattus rattus*, *Mus booduga* and *Millardia meltada*. Zinc phosphide (2%) loose bait prepared in rice + ragi and crushed groundnut smeared with 3% groundnut oil and wax cake formulations of brodifacoum and bromodiolone (0.005%) were applied in live burrows,whereas the snap traps were laid @ 50/ha. The efficacy of each treatment was calculated based on the per cent reduction in number of live burrows and per cent pod damage.

The results as detailed in Table 1 revealed that zinc phosphide baiting yielded 69.38% reduction in live burrow count within two days of treatment, whereas no such effect was observed with brodifacoum and bromodiolone (0.005%) treatments due chronic effects of these chemicals. However, both the anticoagulant treatments yielded 75.00 (brodifacoum) and 70.27 (bromodiolone) percent reduction on 7 th day after treatment which increased further to 82.14 and 78.37%, respectively after 12 days of baiting. Use of snap traps resulted a success of 46.15 per cent only after seven days. The rodent infestation on the other hand registered 13.4% increase in live burrow count in untreated fields. Similar trends were observed on the extent of reduction in rodent damage to pods which was about 75% under both the anticoagulant treatments and 70.22% (zinc phosphide) and 45% (snap traps). In the untreated control fields, like live burrow counts, the pod damage also increased to 35.13%.

Table 1: Effect of various treatments for the management of rodents in vegetable soybean

Sl. No.	Treatment	Pre treatment Live Burrow cont	Burrow reduction (%) after (days)			Pod damage (%)		Reduction in pod damage (%)
			2	7	12	Pre treatment	15 DAT	
1	Zinc phosphide (2%)	49	69.38	-	-	3.66	1.09	70.22
2	Brodifacoum (0.005%)	56	-	75.00	82.14	4.12	1.03	75.00
3	Bromodiolone (0.005%)	37	-	70.27	78.37	3.86	0.98	74.61
4	Snap traps	65	7.69	46.15	-	4.33	2.38	45.03
5	control	47	0.00	23.46*	13.40*	3.90	5.27*	35.13*

* Increase/ DAT- Days after treatment.

Effect of temperature on bait shyness in rodents

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Rodents cause serious losses to standing crops as well as stored grains. Management of pest rodents mainly depends on use of rodenticides in baits. Zinc phosphide, an acute poison is most commonly used rodenticide (@ 2% conc. in baits) for managing the rodents under field conditions. The residual/ surviving rodents after zinc phosphide baiting avoid the same poison and baits on subsequent exposures. This acquired behaviour is commonly referred as Bait/ poison shyness and is one of the most important limitations with zinc phosphide. The persistence of this behaviour varies from 20-135 days depending upon the species. Present study is an attempt to quantify the effect of temperature on persistence of bait shyness in three rodent species viz., *Tatera indica*, *Rattus rattus* and *Funaambulus pennanti* at two temperature regimes (i) 31°C (range: 28 - 35°C) and (ii) 21°C (range: 18 - 25°C). The findings revealed that the bait shyness behaviour persists for 75, 50 and 25 days in *T.indica*, *R.rattus*

and *F. pennanti* respectively at higher temperatures. However, at lower temperature regimes, the period is reduced to 50, 35 and 20 days in respective rodent species indicating a decrease of 20-33% as compared to higher temperature regime. The results therefore indicated that temperature had significant role in regard to persistence of bait shyness. The role of additives like the change of oils (coconut oil/ground nut oil (2%) and salt 1%) in the preferred bait exposed for three days after the induction of shyness was found to play a significant role in early mitigation of bait shyness in rodents. Exposure of bait shy rodents to coconut oil treated baits for three days proved effective in mitigating the shyness behavior to a greater extent. The period was reduced from 10-40 days (at 28 - 35°C) and from10-25 days (at 18 - 25°C) in comparison to control in different species. (*Courtesy: Abstracts, National Symposium on Resource Utilization through integrated Farming System and Biodiversity conservation in drylands, Bhuj. pp 75-76*)

Effective doses of zinc phosphide and bromadiolone baits against female *Rattus rattus*

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Ten mature and healthy female *Rattus rattus* live trapped from poultry farms at Ludhiana were kept individually in laboratory cages for acclimatization for 10-15 days. Food and water were provided ad libitum. Food was prepared by mixing cracked wheat, powdered sugar and groundnut oil in ratio 96: 2: 2 (WSO). Rats were weighed and divided into two groups of five each. Poison baits for zinc phosphide (2%) and bromadiolone (0.005%) prepared using whole wheat grains were fed to experimental rats under no choice conditions. Five rats of group I were fed on one, two, three, four and five grains of zinc phosphide (2%) bait, respectively and those of group II were fed on one, two, three, four and five grains of bromadiolone (0.005%) bait, respectively. The grains were almost of similar size (Mean weight/grain: 0.23 ± 0.01g). Results revealed no mortality in rats of both the groups fed up to five grains i.e. up to a of 1.15g bait. After 15 days of first treatment, the same rats were again fed with similar rodenticide baits, but with increased quantity of six, seven, eight, nine and ten grains of zinc phosphide (2%) bait and bromadiolone ().005%) bait, respectively. In group I, rats fed on eight, nine and ten

grains weighing 1.84, 2.07 and 2.30g were found dead after 4-10 hours of treatment i.e. 60% mortality. However, in group II, only one rat (20% mortality) which had consumed six grains of bromadiolone bait (1.38 g) died after five days and five hours. Other rats of this group which had eaten more than six grains weighing 1.61 to 2.30g did not show any mortality up to 15 days after treatment. Results thus revealed feeding of average 2.07 ± 0.19g of zinc phosphide (2%) is required for causing mortality in female *R. rattus*. The effects of zinc phosphide bait were thus dose specific, however, the effects of bromadiolone bait were not found to be dose specific. These were rather individual specific (Table 1) as there was mortality at lower intake (1.38g) and no mortality in rats feeding even higher doses up to 2.30g.

Table 1. Effective doses of zinc phosphide and bromadiolone baits against female *R. rattus*

Treatment (n = 5 each)	Rat No.	No. of grains and weight (g) fed during first exposure	Mortality	No. of grains and weight (g) fed during second exposure (after 15 days of first exposure)	Mortality
Group: I Zinc phosphide (2%) bait	1	1 (0.23)	Nil	6 (1.38)	Nil
	2	2 (0.46)	Nil	7 (1.61)	Nil
	3	3 (0.69)	Nil	8 (1.84)	Yes
	4	4 (0.92)	Nil	9 (2.07)	Yes
	5	5 (1.15)	Nil	10 (2.30)	Yes
Group:II Bromadiolone (0.005%) bait	1	1 (0.23)	Nil	6 (1.38)	Yes
	2	2 (0.46)	Nil	7 (1.61)	Nil
	3	3 (0.69)	Nil	8 (1.84)	Nil
	4	4 (0.92)	Nil	9 (2.07)	Nil
	5	5 (1.15)	Nil	10 (2.30)	Nil

Boi- A new rodent pest on oilpalm in Mizoram

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A mammalian pest commonly called as Boi in Mizo language (India) is found feeding on the roots of young oil palm plants in Mizoram state. The pest which is a rodent bores in to the root zone of the plant and feeds on the boll region making the plant to die. It bores 5-10" below the ground level and attacks the young palms of 1-5 years old. The plants don't show any visual symptoms except drying of spindle at first followed by the

surrounding leaves. Within 3-4 days of attack the palms are found dried. A heap of soil is observed at far off places not near the palms as seen in case of rat's damage. The animal is seen burrowing to the root zone of the plants and thereby feeding on the boll region. It is found to stay 4-5' inside the ground level and starts feeding on the roots first followed by boll portion. It is called as lesser bamboo rat *Cannomys badius*. It is a big sized rodent weighing 1-2 kgs and possesses big size incisor teeth. Incidence was observed more in Kolasib and Mamit districts particularly during rainy season along with bamboo flowering. Found to live in burrows and feeds on rice and other crops also. Local people prefer to kill and eat where ever it is found.

Success story on reduction of Leptospirosis incidence with Anti-rodent campaigns in Gujarat

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Leptospirosis, a bacterial disease has become endemic in several parts of India. The areas include Andaman and Nicobar Islands, Kerala, parts of Gujarat, Orissa and Maharashtra. Rodents were recognized as most important and widely distributed reservoirs of leptospiral infection (WHO, 2003). Several incidences of human and animal leptospirosis in over forty countries were traced to rodent origin. Limited work in India indicated four rodent species i.e., Norway rat, *Rattus norvegicus*, House rat, *R. rattus*, Lesser bandicoot, *Bandicota bengalensis* and Larger bandicoot, *B. indica* are associated with this disease. Humans are dead end hosts and do not transmit the infection. The interventions to prevent this disease can be technically through (i) rodent vector control i.e., preventing rodents in the surroundings and (ii) improved hygiene. Due to yearly recurrence of this disease in South Gujarat districts having *B. bengalensis* as major rodent species and majority of patients (83.4%) are agriculture workers, an attempt was made to prevent the disease through the management of this vector species of the disease.

Departments of Agriculture and Public Health of Gujarat State got the scientific support of National Institute of Plant Health Management,

(Ministry of Agriculture, Government of India), Hyderabad and All India Network Project on Rodent Control (ICAR), Central Arid Zone Research Institute, Jodhpur in planning, implementation and monitoring of the anti rodent campaigns. To achieve this, State Level and District level Workshops were conducted in the early 2009. The management planning was made considering (i) specific areas/villages with the prior disease incidence, (ii) time of control operations i.e., before the onset of monsoon, (iii) timely procurement of inputs for control operations and (iv) community participation for effective prevention of the infection to humans as well as animals as per the guidelines indicated in Indian Journal of Medical Microbiology (Rao, 2006, Vol 24(4) 324-328). Financial assistance was provided by Ministry of Agriculture to carry out the community involved rodent control campaigns covering both sugarcane fields and adjoining residential premises using 2,232 kg of bromadiolone, a second generation anticoagulant. The activities were undertaken in four districts viz., Surat, Tapi, Navsari and Valsad located in Southern Gujarat. The results are presented in the Table 1.

The reduction in the Leptospirosis cases was 61 per cent in the campaign implemented villages during 2009 compared to 2008. Further, the rodent damage to sugarcane was reportedly reduced up to 5% cane damage compared to 15-20% normal cane damage, when the anti rodent campaigns were not undertaken. It was also observed that the annual rainfall was 91% of average during 2009 in these districts, while it was 100 per cent in 2008. This deficit rainfall of 9% might also be one of the contributing factors for the reduction in the disease incidence. The implementing Departments are planning to extend the anti rodent campaigns in future years also in an effort to reduce leptospirosis incidence.

Table 1. Impact of rodent control campaigns on incidence of leptospirosis in South Gujarat

Name of the District	Total no. of villages	No. of villages covered	Area treated (ha)	Bromadiolone used (kg)	No of cases of Leptospirosis in		Reduction of Leptospirosis incidence (%)
					2008	2009	
Surat	407	43	2102	784	220	78	64.55
Tapi	148	15	1942	777	133	40	69.92
Navsari	397	18	442	177	131	43	67.18
Valsad	178	38	1235	494	74	54	27.03
Total	1130	114	5721	2232	558	215	61.47

Report on Refresher Training Programme on Rodent Pest Management in Bihar

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On the request of Department of Agriculture, Bihar National Institute of Plant Health Management (NIPHM) Hyderabad organized a 6-Day Refresher Training on Rodent Pest Management from January, 08-13, 2012 at ICAR Research Complex for Eastern Region, Patna under National Plan on Rodent Pest Management (Plate 4). Thirty six (36) officers from different districts of the State participated in the training programme.

The program was inaugurated and presided over by Dr. B. P. Bhatt, Director, ICAR Research Complex for Eastern Region, Patna in presence of Mr Gulab Yadav, Joint Director, Plant Protection, Bihar, Dr. Mohd. Idris, Sr Scientist, ICAR, Dr. N. Srinivasa Rao, Assistant Director (RPM), NIPHM and Deputy Director (PP) Bihar. Dr Bhatt highlighted the problem of rodents in various crops and expressed happiness for having such a need based training program in the State. Mr Yadav informed about the recent rodent outbreak Kosi division and expressed gratitude to the Department of Agriculture and Cooperation (GOI) and NIPHM for their support in managing the rodent menace. Dr Sriniwasa Rao detailed the role of NIPHM in implementation of National Plan on Rodent Pest Management.

During the Technical session, Assistant Director (PP) detailed the rodent associated problems in different sectors in the State. Joint Director (PP) explained about rodent problems and production losses in different crops in the State and in particular to the Madhepura district. Dr. Arvind Kumar, Sr. Technical officer, Directorate of Rice Development, Patna presented statistics on rice production and production constraints particularly by the rodents in the State. Dr Idris took a detailed lecture on economic importance of rodent pests in agriculture, commodity storage and other sectors. Dr Srinivasa Rao explained the participants about general morphology and basics of rodents.

Participants were exposed to importance of rodents in public health by AD (RPM) on second day. Theory lectures on rodent taxonomy and practicals on different groups of rodents including laboratory diagnosis

were also conducted. After class room activity on methodology of rodent infestation and damage assessment protocols, the trainees assessed the rodent infestation levels and damage in different crops (Table 1). The infestation and damage were very high in brinjal and potato crops mainly by the lesser bandicoot rat, *Bandicota bengalensis*.

Table 1. Assessment of rodent damage to crops

Batch No	Crop	Area Scouted	Live Burrow Index (LB/ha)	Infestation rate
1	Bengal gram	2. 5 ac	97	High
2	Bengal gram-Wheat	1.0 ac	563	High
3	Berseem	2. 0 ac	18	Low
4	Wheat	2.5 ac	14	Low
5	Potato- Bengal gram	2.0 ac	175	High
6	Brinjal	0.2 ac	360	High
	Potato	1.5 ac	273	High

Exercises on rodent seasonal calendar for different cropping systems like rice-pulse-wheat, rice-vegetables, sugarcane, storage commodity structures, vegetables- potato etc., were undertaken. Each group explained calendar and identified the critical periods of rodent problem interventions for its management. Participants interacted with the farmers and collected base line data i.e KAP analysis, pertaining to rodent pest management. After analysing the data they identified the motivational media for active participation by the farming community (Table 2).

Table 2. Knowledge, Attitude and Practice (KAP) Analysis

Farmer Sample No.	% score			Remarks
	Knowledge	Attitude	Practice	
1	55.0	65.0	66.5	83% of farmers with moderate and 17% with high level of knowledge and practices. 33% of farmers found innovators, 50% secondary adopters and remaining 16% are laggards. The best motivational media for the village is demonstrations and farmers' interactions
2	70.0	90.0	50.0	
3	52.5	31.0	50.0	
4	70.0	50.0	50.0	
5	65.0	62.0	52.0	
6	90.0	93.0	88.0	

On day 4, the participants were explained about techniques of non-chemical and chemical management of rodents in fields and storage. Different types of rodenticides, their mode of action, preparation and application of poison baits and safety precautions in handling rodenticides/

baits was explained. Participants were briefed about the significance of ethology and reproductive biology in rodent management. On fifth day, participants were explained about concept of Farmer Field Schools in Rodent Pest Management and individual groups identified different rodent management practices that fit well into their cropping systems at different stages of the crop. The Project Coordinator, AINP on Rodent Control, CAZRI, Jodhpur interacted with the trainees on latest advances in rodent pest management and planning processes.

Impact points of the training program with respect to training of trainer farmers were discussed by Joint Director (Vertebrate Pest Management) and a 5-day curriculum for trainer farmers was formulated. The Joint Director of Agriculture, Plant Protection, Bihar interacted with the participants on the steps to be taken for organizing rodent control campaigns and a action plan for community based rodent control campaigns was worked out. The programme concluded with a brief valedictory session chaired by Director, ICAR Research Complex for Eastern Region, Patna.

Railways working to tackle rodent menace at Delhi stations

Plagued with the problem of rats at stations and in coaches, Northern Railway has roped in a pest control agency to tackle the menace. "We have awarded contracts worth Rs 1.69 lakh per month to a pest control agency to do away with the menace of rats and other rodents at rail premises including coaches, platforms and station yards in Delhi Division," said a senior Northern Railway official. While it will cost Rs 64,000 per month to make in New Delhi station rodent free, for Old Delhi and Nizamuddin stations, the pest control agency is charging Rs 38,000 and Rs 29,000 per month respectively. The pest control measures are costing Rs 38,000 per month for Ghaziabad and Meerut stations.The rodent control treatment is going on in all major depots of the division, said the official. However, despite the pest control measures, New Delhi station, one of the the busiest stations in the country is yet to be free of rats and rodents. "There are stray cases, at times, when the rats sneak into the station yard premises from nearby grain shops in Sadar Bazar area around New Delhi station," the official said. (Source: money control.com, dated 08.06.2012)

Plate 3. Himalayan Marmot, *Marmota himalayana*
From: Ladakh area Photo credit: Dr. Uttam Saikia,
(Courtesy: Dr S.S. Talmale)

Plate 4. Refresher Training on Rodent Pest Management in Patna (January, 8-13, 2012)

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

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