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RODENT

Newsletter

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



Apex Level Training on Rodent Pest Management at Maruteru



Exhibition on Rodent Management during Kisan Mela at Punjab Agricultural University, Ludhiana Sept. 17-18, 2008



Tripura farmer showing rodent damage in rice

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

Rodent pest problems in plantation crops and strategies for their management

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In plantation crops rodent inflict three types of damage. First type occurs at nursery stage when rats and squirrels damage seeds and young saplings. The second type involves stunted growth and drying of trees due to gnawing and nibbling of the roots of saplings and young trees by fossorial rodents mainly the bandicoots. The rodents gnaw through the collar into the crown and kill the young plants of coconut and oil palms. The third type of damage is the main cause of loss and it involves damage to the fruits by arboreal species like, *Rattus rattus*, *R. rattus wroughtoni* and *Funambulus* species. Crop losses due to rodent pests in coconut alone are upto 15% in Andhra Pradesh, 9.3% in Gujarat, 28.5% in Kerala, 15% in Tripura, 32% in Andaman & Nikobar and 50% in Lakhadweep islands.

I. Diagnosis of rodent damage to plantation crops

S.No.	Crop	Nature of damage	Rodent species involved
1	Coconut	<ul style="list-style-type: none"> • Presence of dried seedlings in nurseries and on uprooting rodent tooth marks are visible. Seedlings and young plants are vulnerable to attack. Soft vegetative tissues are consumed resulting into death of palms, if apical meristem is destroyed. • Palm trunks are easily climbed to gain access to fruit-branches. Fleshy oil-bearing mesocarp is gnawed and consumed. Ripe fruits are preferred. Even partially damaged nuts undergo abscission. • Developing nuts are attacked close to point of attachment to 	<p><i>Bandicota bengalensis</i> and <i>B. indica</i></p> <p><i>Rattus rattus</i> and <i>R. r. wroughtoni</i></p> <p><i>Rattus rattus</i> and <i>R. r. wroughtoni</i></p>

2	Cocoa	<p>the inflorescence and a hole is made, typically about 65x40 mm. Damaged nuts remain in the palm crown for 3-5 days and fall down.</p> <ul style="list-style-type: none"> • Germinating seeds in nurseries and young plants in fields are destroyed. • Pod damage is mainly restricted to ripe fruits. The tough husk is gnawed through to create a jagged hole, the beans are taken out and surrounding mucilage is scrapped off, eaten and discarded beans are found on the ground. Rats and squirrel damage can be distinguished by the position of damage hole on the pods 	<p><i>Rattus rattus</i>, <i>R. r. wroughtoni</i> and <i>Funambulus</i> spp.</p> <p>(i) Holes at the center of the pods: <i>Funambulus palmarum</i> and <i>F. tristriatus</i> (ii) Holes are near the peduncle: <i>R. r. wroughtoni</i></p>
3	Oil Palm	<p>Mesocarp tissues of fruits are bright orange and when damage by rodents, retain its colour for 2-3 days and later it turns brown after drying.</p>	<p><i>Bandicota bengalensis</i>, <i>Rattus rattus</i> <i>R. r. wroughtoni</i> and <i>Funambulus</i> spp.</p>

II. Methods for rodent damage assessment:

(a) Coconut: Select a block of plantation with 100-150 trees; identify and count the number of infested trees on the basis of freshly fallen damaged nuts near tree base and calculate percent rodent infested trees (RI) using the formula:

$$RI (\%) = \frac{\text{No of trees with fallen nuts} \times 100}{\text{Total number of trees}}$$

For assessing percent nut damage select 10 trees with fallen nuts in the same orchard and record number of healthy and damaged nuts on the selected trees covering all branches.

$$\text{Nut damage (\%)} = \frac{\text{No of damaged nuts} \times RI}{\text{Total number of nuts}}$$

(b)Cocoa: Since rodent damage is restricted to ripe pods, it may be categorized as healthy or undamaged, scratched and freshly bitten pods. Percent pod damage is calculated as

$$\text{Pod damage (\%)} = 100[(b+c)/a+b+c]$$

where, a = No. of undamaged pods; b = No. of scratched pods and c = No. of freshly bitten pods.

(c) Oil palm: Fresh fruit damage is worked out by counting undamaged and damaged fruits in each palm by the formula;

$$\text{Fresh fruit damage(\%)} = 100(a/b)$$

where, a = No. of palms with fresh fruit damage and b= No. of palms assessed.

III. Strategies for rodent management:

No single method of rodent control is feasible in different pest situations, therefore all the available management options are to be integrated as a package for managing the rodent problem in plantation crops. The principle of rodent management advocates clean environment in the orchards to discourage the rodents' establishment in the area. Adoption of optimum spacing for planting @ 120-135 trees/ha, periodic removal of hanging fronds and cleaning of crowns also suggested.

(i)Coconut: Banding of trunks with metallic sheet and fixing of metal cones prevents *R. rattus* from climbing the tree to get access to nuts. Studies revealed that use of rodenticidal baits are more economical and efficient than trapping. Bromadiolone cakes (0.005%) is therefore recommended for rodent management in coconut. Two cakes (30-35g) are to be placed on the crown of each palm one on each side at the base of panicle bearing tender nuts. The treatment may be repeated after 10-15 days wherever damage persists. Two operations i.e., before and after monsoon are sufficient to check the rodent damage for entire year. Simultaneous control operation in farmhouses, storage structures and surrounding wild vegetation should also be undertaken to prevent re infestation. Community participation is a pre requisite.

(ii)Cocoa: Placement of 4-5 bromadiolone cakes (0.005%) per tree at the base and on the forks of pod bearing branches is recommended. Initiate rodent control operation before ripening of the cocoa pods and repeat at weekly intervals till pest population is under check. Bromadiolone

cakes should also be kept in the fields in bait stations. If cocoa is intercropped with coconut rodenticidal baiting should be done on coconut palms also.

(iii)Oilpalm: Place bromadiolone cakes at the base of each young palm. For mature palms place one bromadiolone cake along the rodents pathway at the base of the palm as well as on the crown. Treat rodent harbourage also to check reinfestation.

Incidence of rodent pest species in three agro-climatic zones of Karnataka

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1. Eastern Dry Zone: The studies carried out in Eastern dry zone in paddy (*Oryza sativa*), Ragi (*Eleusine coracana*), Redgram (*Cajanus cajan*), Maize (*Zea mays*) and Sapota (*Agraza zapota*) fields. Species composition and extent of damage to various crops are;

(a) Rice: Incidence of rodent pests was relatively lower at vegetative growth as compared to harvesting stage of rice crop. The species composition was *Bandicota bengalensis* > *Mus booduga* > *Mus platythrix* > *Tatera indica*. The extent of damage from nursery to harvesting stage ranged between 4.0- 5.8 per cent.

(b) Ragi: The rodent pest incidence was low at land preparation stage and increased at vegetative growth and harvesting stage. The species composition was *B. bengalensis* > *Millardia meltada* > *M. booduga* > *T. indica*. Crop damage by rodents was 0.20 to 4.85 %.

(c) Redgram: The infestation was found at the time of sowing and pod formation stage. The density varied between 4 -5 live burrows/ha and the species composition was *B. bengalensis* > *M. meltada* > *T. indica* with 2.6 to 3.9 per cent crop damage

(d) Maize:The infestation was found at sowing and germination stage with rodent burrow density of 3 to 21 /ha. The species composition was *B. bengalensis* > *T. indica* > *M.meltada* with 1.52 to 4.85 per cent crop damage.

(f) Sapota The observation from flowering to fruit harvest revealed the average population density (13-19 live burrows/ha). The species composition was *B. bengalensis* > *T. indica* > *M. meltada*.

2. Northern Dry Zone: *B. bengalensis* and *M. booduga* were the predominant species in this zone. Damage to groundnut, maize, and sunflower was 10.0, 2.0 and 2.0 per cent, with a mean live burrow density of 40, 18 and 20 per ha, respectively.

3. Northeastern Transition zone: The detailed observation on different rodent species and density in sugarcane (3 to 5 month crop), indicated predominance of *B. bengalensis* followed by *M. meltada* > *M. booduga* > *T. indica*. Live burrow density in sugarcane and soybean ranged from 12-15 and 6-12/ha respectively.

Status of bamboo flowering and rodent situation in Meghalaya and Tripura

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The report summarizes the field surveys undertaken by us during April 2008 in two NE states of Meghalaya and Tripura and discussion with state officials and farmers.

Meghalaya: The state reported gregarious bamboo flowering in 4 districts, viz., West Garo, East Garo, South Garo and West Khasi hill districts. We visited fields and forested areas of East and West Garo Hill districts, where gregarious flowering of *Melocanna baccifera* was observed all through these two districts. Sporadic flowering of this bamboo species was reported in early 2007 and became gregarious by early 2008. Drooping of the flowered bamboo was noticed at many places in these districts. Rodent activity in the area may start after drooping of the bamboos when the migration of forest dwelling rodents starts, in the absence of their regular food supply in bamboo forests. Due to this reason, the state is required to activate the extension machinery for initiating urgent actions for rodent control involving whole community in the drooping areas. According to state Government records, surveys were conducted in 21 village during 2007-08 covering 32,960 hectares out of 40,694 hectares of bamboo flowering area. 2,185 hectares under jhum and wet rice cultivation (WRC) areas was affected by bamboo flowering. In west garo district alone in four subdivisions viz., Tura Sadar, Ampati and Dadenggre, the

bamboo flowering area was 4875 ha (near Jhoom fields) and 2331 ha (near WRC fields), however only 1640 ha was affected by rodent incidence. The state organized awareness creation trainings and distribution of literature and rodent control campaigns in villages and popularized local traps and usage of rodenticidal baits. One district level training and 28 field level training cum demonstrations were organized by the state during the year. Reduction in rodent population from 50-65% was achieved. Reports on bamboo flowering incidence are pouring in from the remaining three districts also although to a lesser extent. It was suggested that the State should initiate intensive survey, rodent surveillance and rodent management activities in these 3 districts also to prevent potential crop damage by rodents.

Tripura: Department of Agriculture informed that in Tripura impact of rodent problem synchronizing with bamboo flowering was mostly observed in upland region especially in North Tripura district. Muli bamboo (*M. baccifera*) occupies 1940 sq km in the state (almost 93% of state's total forest area.). Sporadic bamboo flowering in the State started in 2001, however reports of bamboo drooping after gregarious flowering are received from three districts – Dhalai (1050 ha), South (500 ha) and West Tripura (4470 ha). An average rodent damage of 9.38% was reported to rice crop. In south Tripura District alone rice crop registered 4.3- 12.5% rodent damage. In jhooms the higher damage intensity (7.2-23.2%) was reported. Maize and pine apple too suffered rodent damage to the tune of 8-9 and 4.7- 8.5% in Tripura. The rodent species responsible for the damage are *Bandicota bengalensis*, *B. indica*, *Rattus rattus*, *R. nitidus* etc. Incidence of *B. indica* in the plain cultivated areas is a cause of concern as its dominant colonizing activity, replacing other rodents is likely to pose serious threat to rice crop in the region. The state initiated rodent surveillance and management activities in addition to awareness creation measures among *jhumias* and other farmers. Second generation anticoagulant rodenticides baits are being provided to the farmers. Besides indigenous bamboo made rodent traps, viz., Kholi Chang and Kholi Faukhlai, Phang Chep, Kholi Changkhe and Kawl Per belonging to Reang, Lusai, Tripuri and Mizo ethnic groups, respectively were identified and are being used successfully. Local practices like utilization of leaves of *Dillenia indica* (Family: Dilleniaceae) regarded as repellent is also being encouraged.

Suggested actions in view of current situation

1. The current situation of drooping bamboos in the gregarious flowering areas is likely to cause severe rodent depredations to the surrounding *jhum* crops and WRC fields. Hence the concerned district agriculture authorities should initiate immediate measures to monitor the situation closely and undertake vigorous rodent control activities.

2. The rodent problem intensity will not be significant in the areas where the forested areas has other vegetation/trees along with bamboos, due to availability of alternate food for the forest dwelling rodents. Hence micro-planning should be made by district authorities to focus the attention in potential areas with threat.

3. Since the rodent problem emanates from the migrating forest dwelling rodents to the *jhum* as well as WRC crops due to shortage of natural food in forests, anticoagulant baiting using permanent bamboo bait stations should be employed. Besides, local bamboo traps should also be used for tackling the migrating rodents.

4. Severe problem of larger bandicoot, *Bandicota indica* was seen in Tripura. This pest probably entered Tripura from Bangladesh. Since the species causes significant crop losses, planning for its control should be made by the Department of Agriculture through regular surveillance activities.

Village level rodent pest management in Karnataka – A case study

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The extent of rodent damage to cultivated crops in Karnataka is 8-20% to rice; 7% to finger millet; 5-10% to vegetables; 30-100% to seedlings of sunflower, 30-40% to seedlings of groundnut, 4-7% to seedlings of maize, 5-10% to sapota, 10-50% to coconut, 20% to cardamom, 50% to pomegranate and 5% to areca nut inflorescence. Therefore rodent pest management has to be an integral component of agriculture in the State. However for making rodent control programmes successful, it has to be undertaken over vast areas with well-defined geographical barriers to prevent pest population migrating from untreated areas. The concept of so-

cial engineering activity in rodent control is to motivate farmers to take up rodent control *en mass* in houses and in fields- cultivated as well as barren lands in and around the village. Once the geographical barriers are defined the next step is to organize and launch rodent control programme based on established technologies involving the villagers. Given the multitude of problems faced by the farming community in India, implementing community based rodent control needs tremendous efforts to motivate the farmers to adopt the technology. Motivation was achieved by organizing village level meetings involving co-operative milk societies, *gram panchayats*, school children & teachers, and NGOs working in the area. Through these meetings farmers and villagers were enlightened about rodent damage to crops, stored food, identification of pest species as well as health hazards associated with rodent infestation using audio-visual methods. These included TV films, slides, charts and live specimens of major rodent pests of Karnataka and their management.

In the first phase of the programme, all inputs, viz., baits, poisons were given free. But sensing "taken for granted" attitude of farmers, if poison and bait were given *gratis*, the *modus operandi* was slightly changed to giving only groundnut seeds, groundnut oil and rodenticides and requesting farmers to provide cereal component of the bait namely rice and finger millet which they did happily. The amounts contributed were proportionate to the size of their holdings. The bait was prepared in front of gathered villagers by mixing rice, ragi (finger millet), groundnut oil, and groundnut seeds in the proportion of 45:45:5:5 for pre bait. Twenty grams of this pre bait mixture was transferred to plastic covers measuring 6"x4" and the cover was loosely knotted. Farmers themselves introduced one such cover into each 'live' burrow in the field on the first day. On the third day 2% zinc phosphide was mixed with the cereal-groundnut oil-groundnut seed mixture. Ten grams of this poison bait was transferred to plastic covers and burrows were baited as explained above. Using plastic covers is safe, target specific and the chances of poison bait getting mixed with soil inside the burrow and secondary poisoning are nil. On the fourth day "live" burrows were poisoned with bromadiolone cakes at the rate of one cake/burrow. This integrated approach reduces field rodents by 70-80% in a single operation. Along with field rodent control, baiting household rodent pests with bromadiolone cakes was also undertaken. Two surveys – pre and post control- on density and damage in treated and untreated villages, awareness created about rodents and their control was carried out and the impact was assessed.

The concept of socially engineered rodent control was implemented for the first by AINP on Rodent Control in Mandya district. Till date over 50 villages in 5 districts under three agroclimatic zones of Karnataka have been covered under this programme. From irrigated paddy fields, the campaign has been successfully carried out in rainfed agro-ecosystems of the state. At the average density of 100 people per village around 5,000 farmers have been educated about the technology of rodent control and the necessity of community based approach to control rodents. Approximately 10000 hectares of cultivated fields along with some barren land has been subjected to intensive rodent control measures. Pest populations have been reduced to less than 30%. Damage prevented varied from 70-90% for all the crops studied. The cost benefit ratio ranged 1:20 to 1:50. The feedback received from farmers during later visits revealed that farmers imbibed rodent control technology successfully.

The success of social engineering activity in rodent control during 2006-07 in Kodihalli, Konagatta and Linganhalli villages of Bangalore rural district is reflected by the fact that a total of 200 farmers had implemented the project in their crop fields. At Kodihalli, the campaign resulted in 65.5 per cent population reduction in ragi and jower mixed crop. The extent of reduction in crop damage by rodents was 54 per cent. At Konaghatta, where the major crops are ragi and potato, the project yielded 67.5 percent and 50.0 per cent reduction in population density of rodents in ragi and potato, resulting in 76.10 and 72.40 per cent reduction of crop damage in respective crops. Over 90 per cent mortality of *Tatera indica* and *Mus booduga* was noticed. At Linganhalli, the implementation of social engineering activities resulted in 52.5 per cent reduction in rodent population and about 36.5 per cent reduction in crop damage. Post control census on awareness created in the farmers of these villages indicated higher level of adoption of this technology by the farmers of Bangalore rural district.

Report of Apex Level Training Programme on Rodent Pest Management at Maruteru

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Twenty-second Apex Level Training Programme on Rodent Pest Management was organized at A.P. Rice Research Institute and RARS,

Maruteru (West Godawari District) Andhra Pradesh by Acharya N.G.Ranga Agricultural University (ANGRAU), Hyderabad in collaboration with National Plant Protection Training Institute (NPPTI), Hyderabad from February 12-14,2008.

Dr P. Satyanarayana Reddy, Associate Director of Research, A.P. Rice Research Institute and RARS, Maruteru presided over the inaugural Session. After a brief welcome address by Dr K. Seetarammaiah, Principal Scientist, RARS, Maruteru, Dr A.M.K.Mohan Rao, Rodent Specialist, NPPTI, Hyderabad in his introductory remarks highlighted the objectives of the Apex Level Training Programme on Rodent Pest Management and stressed the significance of rodents in agriculture, storage and public health. He opined that rodent pest management should be included in Undergraduate and Postgraduate courses of the Universities for generating efficient scientific manpower in the subject. Dr Rao stressed the need for village level rodent control campaigns involving the community through training and education. Dr P. Satyanarayana Reddy spoke on economic importance of rodents and acknowledged the efforts of Maruteru center of AINP on Rodent Control in providing trainings on Rodent management to the farming community through Social Engineering Activity of the Project. He also mentioned about the benefits of the eco friendly Burrow fumigator developed by the Center. Mr T. Venkateswara Rao, JDA(PP) West Godawari District(A.P.), Sh Ramachandra Reddy, JDA(PP) Department of Agriculture, Hyderabad, Dr Somasundaram, DDA(PP) Department of Agriculture, Tamilnadu, Dr Shivaiyya, Principal Investigator of AINP on Rodent Control, University of Agricultural Sciences, Bangalore and Dr M. Nanda Kishore, Principal Investigator of AINP on Rodent Control, APPRI &RARS, Maruteru, also shared their views on this occasion. A Manual on Rodent Pest management was released on this Occasion.

The training programme was attended by 24 participants belonging to four states, Andhra Pradesh(14), Tamil Nadu (3), Orissa (1) and Gujarat (6). They represented the departments like, APCSC Ltd (3), CWC (2), ANGRAU (2), Commissionerate of HMS& ME Gujarat (4) Deptt of Agriculture, Andhra Pradesh (7), Tamil Nadu (3) and Orissa (1) and Plague Surveillance Unit, SMC, Surat, Gujarat (2). The resource persons included; Dr A.M.K.Mohan Rao, NPPTI, Huderabad; Dr Vipin Chaudhary, NRC on MAP, Anand, and Dr K. Malla Reddy, Dr Sarups Pest Control Pvt Ltd, Hyderabad and Dr V. Deva Prasad, ANGRAU, Bapatala Dr A. Ranga Reddy, Dr M.Nanda Kishore and Dr N. Srinivasa Rao from ANGRAU, Maruteru.

After the inaugural session, Dr AMK Mohan Rao briefed about broader outlook of 'Rodent Pest Management and its importance'. Dr Vipin Chaudhary lectured on Major Rodent Pest species of India and Dr V. Deva Prasad spoke on Economic importance of Rodents in Agriculture. In the afternoon session trainees were briefed on breeding profile of rodents, role of rodents in Public Health and Rodent Seasonal calendar by Dr Mohan Rao. On second day (13.02.09) the trainees were taken to sakinetipalli village (East Godawari Distt) for field exercises on Diagnostics of rodent infestation and damage in coconut. The trainees were exposed to the farmers about rodent control practices and magnitude of rodent problem in various crops along with live demonstration on poison bait preparation and application techniques. On third day, theory lectures on 'Recent trends in Rodent Pest Management' (by Dr N. Srinivasa Rao), 'Rodent management in rice based cropping systems' (by Dr A. Ranga Reddy) and 'Inspection of Storage premises for Rodent infestation and their management' (by Dr K. Malla Reddy) were organized. Field exercises on diagnosis of rodent infestation in rice fields, demonstration of burrow fumigator and visit to rodent laboratory for identification of live and preserved specimens of rodents were also organized. Dr P. Satyanarayan Reddy distributed the certificates of participation to the trainees during the valedictory function.

NOTES AND NEWS

Trainings on Rodent Surveillance and Management in Meghalaya and Tripura

Meghalaya: A two day Training on Rodent Surveillance and Management was conducted at Turra, the district headquarters of West Garo Hill for state officials of East, West and South Garo Hill districts of the State on 4-5 April, 08. Dr AMK Mohan Rao, NPPTI Hyderabad, Dr R.S. Tripathi, AINP on Rodent Control (ICAR) CAZRI, Jodhpur and Dr D. Kumar, ICAR Research Complex for NEH Region, Barapani imparted the training to 55 officials of State Department of Agriculture and Forests. The training activities included brief on reasons for rodent problem in the bamboo drooping areas, diagnosis of rodent problem, baiting techniques for appropriate control and community mobilization for rodent control in *jhum* fields and wet rice cultivation areas. Skill development exercises were also conducted in baiting techniques including bait station preparation and placement in *jhum* situations in Rongogre and Chenggalma villages in East Garo district to prevent possible accidental toxicity to non-target species.

Tripura: Training on capacity building for rodent management was organized by Dept of Agriculture Govt of Tripura at Agartala on April 7-8, 2008. The Training was inaugurated by Mr Aghore Deb Burma, Hon'ble Minister for Agriculture, Govt of Tripura on April 7, 2008. Seventy state officials from three-bamboo flowering districts viz., Dhalai, South Tripura and West Tripura participated in the programme. Dr A.M.K. Mohan Rao, NPPTI Hyderabad and Dr R. S. Tripathi, AINP on Rodent Control (ICAR) CAZRI, Jodhpur were the resource persons. After the inaugural session, the District Agriculture Officers of concerned Districts provided the feed back on bamboo flowering and rodent problem in their districts. Phenomenon of rodent out breaks vis a vis bamboo flowering in NE region was explained to the trainees. The training included various classroom activities like lectures on Principles of Rodent Management, Rodent Pest Species, Diagnostics of rodent problem, Reproductive profiles of rodents, Role of rodents in public health, Rodenticides and Community mobilization for rodent management in *jhum* fields and wet rice cultivation areas. The field exercises were conducted in Bishalgarh, West Tripura district which included, exercises on damage assessment in rice and coconut, preparation of poison baits and bamboo bait stations, baiting techniques for effective rodent management.

National Symposium on 'Recent Advances in Zoological Sciences: Applications to Agriculture, Environment and Human Health' at Ludhiana:

Indian Society of Life Sciences and Department of Zoology, Punjab Agriculture University, Ludhiana jointly organized a National Symposium on 'Recent Advances in Zoological Sciences: Applications to Agriculture, Environment and Human Health' at Ludhiana from November 16-17, 2008. Seven papers on rodents were included in one of the Sessions entitled 'Zoology and Agriculture'. Dr R.S. Tripathi delivered a lecture on 'Status and Future of Rodent pest management in India'. Other papers on rodents covered topics on (i) Effect of bait additives like sugar and carbon disulphide on bait acceptability by *Rattus rattus* and *Bandicota bengalensis* respectively; (ii) Bait delivery techniques; (iii) Performance of rodenticides at different crop growth stages, (iv) Effect of female urine on social investigation by male *Bandicota bengalensis*; (v) Anti fertility effects of crude cotton seed oil containing gossypol on house rats and (vi) Cellular composition and role of epididymis in sperm maturation in the house rat.

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ANNOUNCEMENT

International Conference on "Nurturing Arid Zones for People and Environment: Agenda for 21st Century" at Jodhpur (November 24-28, 2009)

Central Arid Zone Research Institute (CAZRI), Jodhpur, is completing its 50 years of dedicated services on research and development of Indian arid zone in 2009. On the recommendation of the UNESCO expert, Dr. C.S. Christian, CSIRO Australia, in 1959, Govt. of India took special interest in management and development of the Indian Thar Desert through systematic scientific studies to hasten the pace of research on hot Indian desert, thereby established this Institute in the same year. This was one of the three Institutes in desert research established by UNESCO, others being in Egypt and Israel. This multidisciplinary research Institute was the first of its kind in the world to tackle the issues related to arid zone. The Institute can be visited on the website: <http://www.cazri.res.in>

Arid Zone Research Association of India and Central Arid Zone Research Institute, Jodhpur are organizing an International Conference on "Nurturing Arid Zones for People and Environment : Agenda for 21st Century" from November 24-28, 2009) at Jodhpur as a part of the celebration of the Golden Jubilee of CAZRI, Jodhpur. The Association is a registered body established in 1962 and is publishing a quarterly journal, '**Annals of Arid Zone**', which is acclaimed internationally.

This International Conference intends to provide a unique platform for scientists of national and international repute from India and different parts of the world along with policy planners, agri-entrepreneurs, NGOs and farmers, etc., to focus on important issues for formulating future action plan for sustainable development of these fragile ecosystems. Some of the major themes for the International Conference are;

- Land degradation and desertification
- Sustainable management of natural resources and biodiversity and environment conservation
- Integrated farming systems research including IPM and INM
- Integration of biotechnological and nano technological interventions for sustainable farm productivity

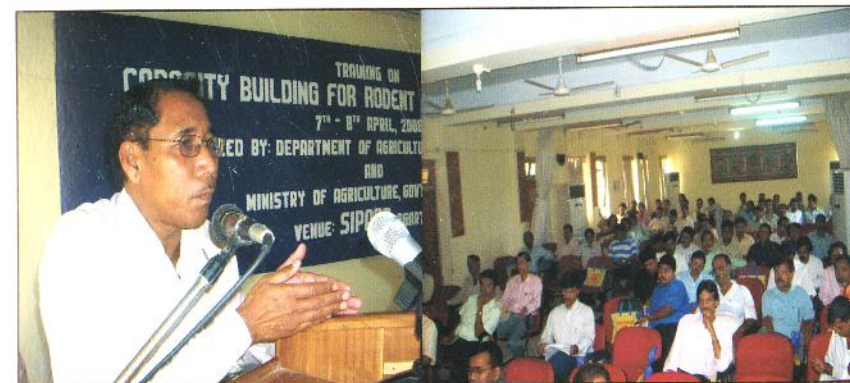
- Harnessing wind, solar and other renewable resources
- Water resources and multiple water use
- Climate change and its impact on dry lands
- Sustainable food production and diversification of agri products through value addition for nutritional and economic security
- Gender issues and women empowerment through income generation and livelihood
- Conservation and management of native livestock breeds and feed security
- Socioeconomic monitoring and impact assessment including market intelligence in view of changing global agricultural scenario
- Development of a world consortium of desert scientists

Scientific contributions are invited on the subjects related to the themes mentioned above. The abstracts may be submitted to the Organizing Secretary of the Conference. There will be some invited lectures and oral/ poster presentations. A proceeding of this symposium would be brought out. Those who wish to publish papers should send the abstract (250-300 words) and full paper in CD with one hard copy using MS WORD/WIN 98/2000/XP. The font should be Times Roman with size 12 point for manuscript and 14 point for title. For details about the venue, Registration fee, important dates for submission of abstracts/papers kindly visit our website <http://www.cazri.res.in/azconf2009> or <http://www.azconf2009.org>

All enquiries and correspondence regarding the Conference may be sent to: Dr R.S. Tripathi, Organizing Secretary, International Conference on “Nurturing Arid Zones for People and Environment: Agenda for 21st Century”, Central Arid Zone Research Institute, Jodhpur-342 003 (India) Phone: (Office) 0291-2786689; Fax: 0291-2788706/2786689; E-mail : azconf2009@cazri.res.in



Training on Rodent Pest Management in Tura, West Garo Hills (Meghalaya)



Mr Aghore Deb Burma, Hon. Minister of Agriculture, Govt of Tripura addressing the officials during Training on Capacity building for Rodent Management in Agartala on April 7, 2008



(a) View of dying bamboo (*Melocanna bacifera*) forest after flowering in Meghalaya and (b) drooping bamboo fruits

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

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

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