RODENT
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ALL INDIA COORDINATED RESEARCH PROJECT ON RODENT CONTROL

CENTRAL ARID ZONE RESEARCH INSTITUTE,
JODHPUR 342 003

RODENT NEWSLETTER

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CONTENTS

Activities of Northern Palm Squirrel, *Funambulus pennanti* Wroughton in grain market area

GIRISH CHOPRA AND M.K. RANA

Kurukshetra University, Kurukhshetra 136 119

Five striped Northern palm squirrel is a chirpy, diurnal rodent found abundantly in the Northern India. Some interesting activities of this rodent were observed from October 1995 to September 1996 in new grain market area at Kurukshetra (Haryana).

The new grain market is located at the outskirts of the city surrounded by vegetable/crop fields . The area has few trees of *Cassia fistual, Dalbergia sisso* and *Acacia arabica* along the roads in the grain market. Also are present many sheds and constructed/ partly constructed buildings in plenty. Wheat, paddy as well as sunflower seeds are traded in different months of the year in this market.

This site was visited at weekly intervals between 10 a.m. 11 a.m. from October 1995 to September 1996. Squirrel activity was observed throughout the year with population during maximum the months of April and September, and population minima, in early July and in December. The number of squirrels seen per visit varied from 2 to 16. A total of 5 squirrel nests were observed in the grain market area only from October 1995 to March 1996. Of these, 3 nests were observed on trees along the road sides (one on *Dalbergia* and two on *Acacia* trees) and one each in the wall crevices and door shutter, respectively (Table 1). The nests were constructed predominantly using ropes, pieces of gunny bags and dried grass leaves at variable heights from the ground. The quantity of rope used varied from 75% -90% in different nests.

Table 1. *Showing nesting sites and heights of nests of F. pennanti is grain market area.*

Sr. No.	Location of nest	No. of nests	Average height (metres)
1.	*Acacia* tree	2	4.5
2.	*Dalbergia* tree	1	5.7
3.	Indoor shutter	1	3.2
4.	In wall crevices	1	6.1

Generally, 2-8 squirrels were seen frequently to feed at the same site thereby indicating that these have a common home range. However, they showed acute territorial behaviour. Throughout the study, there was not even a single instance where the single tree/place had more than one squirrel nest. The squirrel occupying the nest always was found to emit calls as soon as the intruder squirrel approached the nearby branches. The inhabitant was found to chase away the intruder whenerver the latter approached the branch on which the former had its nest.

Effect of Abiotic Factors on Burrow Density of Field Rats

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With a view to record the effect of abiotic factors such as maximum and minimum atmospheric temperature, relative humidity, soil temperature, mositure and its type on the burrow intensity of mixed population of field rats, a study was made during 1995 from January to December in Kalyanpur block, Kanpur. The observations recorded are mentioned in Table 1.

Table 1. *Effect of abiotic factors on the intensity of rodent burrows.*

Months	No. of rodent burrows	Atmospheric temperature (°C)		Relative humidity (%)	Soil temperature (°C)	Soil moisture (%)
		Maxi.	Mini.			
January	64.0	26.73	6.80	77.73	16.32	6.67
February	59.0	25.70	10.24	67.20	18.00	13.33
March	109.0	30.70	14.60	59.80	22.61	10.64
April	253.5	38.20	19.60	33.40	26.62	6.72
May	291.5	42.20	25.40	37.62	31.97	3.45
June	264.0	42.08	25.20	52.40	31.68	4.34
July	75.5	35.68	26.10	72.06	29.00	4.16
August	53.0	32.80	24.90	83.00	26.90	17.30
September	73.5	33.50	23.10	77.40	27.65	13.69
October	68.0	34.19	19.30	60.90	28.22	3.35
November	66.5	29.49	10.99	55.88	26.57	6.66
December	41.0	24.87	8.01	55.95	23.33	4.40
r =		+0.840	N.S. Positive	- 0.738	+0.498	N.S. Negative

The data presented in the Table revealed that the maximum atmosphe temperature is positively correlated with the number of rodent burrows. infers t the increase and decrease in temprature reflected correspondi increase and dercease in the number of rodent burrows. The minimum mospheric temperature has been found non-significant, though the trend v positive. The relative humidty was found negatively correlated. The soil tempe ture has shown positive correlation with the number of rodent burrows wh the soil moisture has no significant effect on the number of burrows, thou ger ral trend was observed to be positive. The mixed field rat species con of *Bandicota bengalensis, Tatera indica, Millardia meltada* and *Mus boodu* in the area under observations. Only active burrows we.e considered this study.

Some observations on the infections Albino Rats, *Rattus norvegicus*

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We maintain a small animal breeding colony at Department of Zoolo Punjab Agricultural University, Ludhiana(30°55'N; 75° 54'E) to supply disea free laboratory animals to various departmen of the University as their requirements for teaching and research purposes. The breeding been, by and large, very successful and incident free.

However, this year certain symptoms of infection which appeared sudde were observed, causing mortality and when treated therapeutically, the anim recovered. These clinical symptoms, first observed on June 12, 1996 we eyes protruding and red in colour, yellowish-coloured fur which came in tufts, lesions on undersurface of feet and under the chin and wei loss.

Infected rats usually died after a week and the first mortality was obsery on 20-6-1996 when three adults (>2 months of age) died, followed two more adults on 22-6-96. Thereafter, symptoms were not apparently visil and it was presumed that the infection was only limited to certain individu But, 15 and 17 young rats (between 20-40 days of age) were recorded de on July 7th and 8th, 1996, respectively from similar infection. Ten ad females showed symptoms of infection on July 8th with one death on 1

July. The post mortem report conducted by the Department of Veterinary Pathology was unconclusive and reported no parasitic infection.

Therapeutic treatment was advised and the animals were given B- Complex (Glaxo Pharmaceutical division, Nashik) and Cephalexin (Veterinary use; Glaxo India, Mumbai) at doses of 5 ml in one litre water and 10 gm in 12 litres of water for five days. The rats recovered and only two young and one adult died on 5th August and 12th August. Threafter. All other rats in the colony were also treated prophylactically and no further infection or mortality was observed in the colony.

The infection was observed only in case of albino rats and not in any of the other species of animals, viz: albino mice, guinea pigs and rabbits, bred at this colony under similar controlled conditions of temperature.

It is, thus, concluded that the prophylactic measures adopted by the above mentioned drug administration are useful in avoiding the infection with observed symptoms at least for albino rats.

Preference of the Indian Mole Rat, *Bandicota bengalensis* for different rice varieties

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We have some information regarding the food habits of field rats. We also know that rats damage food grains and vegetables for the purpose of consumption , storing and they are very sensitive in food selection. But, we know very little about their food choice, special affinity to different varieties of paddy and wheat.

In the context of rice and wheat cultivation, we feel it necesary to know the choice or preference of the rats regarding different varieties. Once we come to know the preferences, we can try to minimise the loss of food grains.

Hence, we made an attempt to study the food preference (between rice varieties) of field rats, *Bandicota bengalensis* under both Laboratory and field conditions. As *B. bengalensis* is the prdeominant species in our agricultural frm at Giridih, Bihar, we conducted the study on this species only.

Twenty Five rice varieties, both indigenous and HYV, including three fine scented varieties were selected. The varieties were classified under three categories, i.e., coarse, medium and fine (scented). Three metal cages were used for this experiment. Each cage has provision for five small food containers and a water pot. It has a divider inside. The divider was used to confine the rat in a part inside the cage to provide food and remove the unused gains. Three rats of almost the same size and weight were captured for our experimental field for this trial.Five hundred (500) rice grains (total wt. varies from 5.1 to 13.1) of each selected varieties from three categories (coarse-2, Medium -2 and Fine-1) were considered as a set. Such a set of grains were given in the cage for consumption for three consecutive days. Five such sets were tried for three days each, making a total 15 days trial. Grain counts were taken after 24 hrs.

The data suggest that *Bandicota bengalensis* has an affinity to fine (scented) varieties. Consumption data of five sets show (Table-1) a significant difference between coarse, medium and fine varieties, except set no. 5. Field data also shows a similar trend. Rats damaged more plants of fine varieties in comparison to other varieties at maturity stage.

Table 1. Average consumption of grain (%) of 3 days

No. of sets	Coarse	Medium	Fine (scented)
1	58.5	56.8	71.0
2	59.0	46.0	66.0
3	56.3	51.0	70.0
4	61.5	52.0	92.7
5	67.0	66.5	57.0

Rodent Damage in Vegetable Crops at Medium High Altitude

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The experiment was conducted at ICAR Research Complex for N.E.H. Region, Research farm, Barapani, Meghalaya (25°30 N latitude and 91°51 E Longitude and altitude, 980 msl). Brinjal, Tomato and chilli crops were

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grown in the field in 1995 to find out the damage by rodents. It was found that brinjal had the average damage of 0.78% (range 0.00-3.15%). It was also noticed that the fruits of lower side of the plant had more damage in comparison to upper side of the plants. The damage of 4.93% (range 0.83- 9.67%) due to rodent was estimated in tomatoes.The damage was recorded higher in the fruits which were about to ripe. Chilli fruits had no damage by the rodents. It was observed that the associated rodent species was *Bandicota bengalensis*, Gray and *Rattus nitidus nitidus* Hodgson.

Evaluation of 0.0025% Difethialone against *Bandicota bengalensis* and *Mus booduga* Under Laboratory Conditions

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The efficacy of newly developed second generation anticoagulant rodenticide, difethialone (0.0025%) was studied in laboratory conditions against Indian mole rat, *B. bengalensis* and Indian field mouse, *M. booduga*. The experimental animals were trapped from agricultural lands and they were caged individually and fed on paddy and water was provided *ad libitum* during acclimatization. They were divided into two groups, viz., adults and sub-adults. The red coloured 0.125% difethialone (formulated by LIPHA, France) liquid concentrate was diluted to O.0025% by mixing with husked rice in the ratio of 1:49.

Bandicota bengalensis

This study reveals that the adult and sub-adult of *B. bengalensis* got cent percent mortality when the single day exposure of difethialone bait under no-choice test. The adult animals had consumed 4.1 ± 0.15 mg/kg and the sub-adult animals had consumed 4.5 ± 1.47 mg/kg of difethialone. The mean days to death was 9.8 ± 0.40 and 8.0 ± 1.02 for adult and sub-adult animals, respectively.

Under choice tests, 80% mortality was observed among the adult and sub-adult animals in a single day exposure of the posion bait. Both adult and sub-adult showed no marked difference in the consumption of plain and poison bait. The palatability of adult animals (45.4%) is better than the sub-adult (34.85%).

The mean intakes of poison by sub-adult animals and adult animals were 1,1±0.35 mg/kg and 2.8 ± 0.68 mg/kg, respectively. The mean days to death were, 7.5 ± 1.44 for adult animals and 10.2 ± 1.50 for sub-adult animals.

Both the adult and sub-adult animals had 100% mortality in two days poison. The mean intake of poison by sub-adult animals and adult animals were, 3.3 ± 0.48 mg/kg and 3.9 ± 0.21 mg/kg, respectively. The mean days to death were 7.8 ± 0.60 for sub-adult animals and 6.10 ± 0.47 mg/kg for adults.

Mus booduga

The study animals were divided into two groups, viz., males and females. Under no choice test,even single day exposure of the poison bait, both in the male and female groups recorded 100% mortality. The male groups consumed 1.5 ± 0.5 mg/kg and the female group 1.2 ± 0.29 mg/kg. The mean days to death were, 4.0 ± 1.00 for male group and 6.0 ± 2.0 for female group.

Cent per cent mortality was observed in both the male and female groups under choice test for one day feeding of poison. The male and female groups took more poison bait than the plain bait. The male groups had consumed 2.3 ± 0.23 mg/kg of poison bait and female had consumed 2.2 ± 0.20 mg/kg of poison bait. The mean days to death were, 11.2 ± 1.60 and 10.5 ± 1.88 for male and female groups of mice, respectively.

Hence, the 0.0025% difethialone baits can be used for the successful control of both Indian mole rat, *B. bengalensis* and Indian field mouse, *M. booduga*.

Cholecalciferol (Vitamin D_3) as a Potent Rodenticide

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Indian gerbils, *Tatera indica* of both sexes were collected from village fields of Bhawani khera (Bhiwani) in Haryana. Toxicological investigations were carried out on vitamin D_3 (Cholecalciferol). Cent per cent mortality was recorded between 22-218 hrs in 55 gerbils used in the studies. The

2 I/C Scene of Crime Van, Office of DIG (Police), Hisar Range, Hisar (Haryana) 125001, India.

mortality of creatures occurred in the following order: Pregnant females, males female, Indian gerbils. Analysis revealed that feeding 0.075% cholecalciferol (Vitamin D_3) in the form of prepared baits of wax, pelleted feed (pellets) as well as both wax cakes and pellets in equal quantities killed Indian gerbils irrespective of their sex.

Indian gerbils avoided plain bait after feeding on cholecalciferol(Vitamin D_3) overnight. They died between 22-218 hrs, 28-165 hrs after feeding on wax and pelleted feed, respectively. Mortality time was curtailed when both baits were provided in equal ratio.The death ensued between 60-78hrs. Prior to the death, their organs became sluggish leading to comma stage. The colour of faecal pellets changed after consumption of lethal dose. The pellets were fluffy yellowish pale in colour as compared to dense brown pellets prior to treatment. Moisture percentage of excretory products was also found to be higher, upto 1.5 -1.7%. Probably watery secretions were either released or could not be reabsorbed.

Cholecalciferol (vitamin D_3) pelleted bait (quintox) differed from conventional acute rodenticides as no baitshyness develops and time to death is also delayed. Moreover, once the lethal dose is consumed, all food intake ceases.

Efficacy of Brodifacoum against the Northern palm squirrel, *Funambulus pennanti* Wroughton

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Northern palm squirrel, *Funambulus pennanti* being arboreal and diurnal is generally considered to be a difficult species from management point of view.

Present study was conducted to understand the effectiveness of fresh poison baits prepared from liquid brodifacoum concentrate. For this, pearl millet grains were smeared with liquid brodifacoum so as to achieve 0.005% concentration in baits on w/w basis. The poison bait was exposed to laboratory acclimatised test squirrels for one day in no-choice feeding test. Results indicated that the bait prepared from liquid brodifacoum knocked down all the test squirrels within 2-5 days (av. 3.0 days). Average poison bait intake was 3.74 ± 0.15 g resulting in mean ingestion of active ingredient of 3.74 ±0.15 mg/kg. Analysis of data of our previous studies on wax block baits and loose baits prepared from brodifacoum powder and the present study indicated that bait prepared from liquid concentrate were more effective than that prepared from powder against *F. pennanti* (Table 1).

Table 1. Efficacy of brodifacoum (0.005%) baits against *Funambulus pennanti* in one day exposure.

S. No.	Baits prepared from	Av. Poison bait intake (%)	ingested a.i. (mg/kg)	Mortality (%)	Days to death, mean (Range)
1.	Liquid brodifacoum	7.26±0.65	3.74±0.15	100	3.0 (2-5)
2.	Powder brodifacoum	–	3.26	66	7.6 (6-12)
3.	Ready to use Wax blocks	4.85±0.31	2.11±0.30	100	6.8 (4-9)

Control of *R. rattus* in An Aquarium Through Eco-Safe Traps and Ultrasonic Repeller – A New Approach

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The present day need is not the dearth of rodent control procedures but the applications of most appropriate methods well suited for the different ecological conditions. To keep the environment safe and free from chemical hazards, use of nonpoisonous methods to control pests are in practice. In this context, development of eco-safe traps is one of the latest methods. The efficacy of eco-system traps in different ecosystems, viz., poultry houses, food factories, food stores, museums, restaurants, bakeries and residential houses indicated their effectiveness. Similarly, ultrasonic repellers constitute a new development in pest control. Experiments conducted by different authors indicated that rats become immune to the sound, noises were not reflected round corners or transmitted through sound barriers and partly become used to them, on the other hand some test conducted with *R. rattus* and *M. musculus* under experimental conditions using an ultrasonic unit which emitted a variable (24- 28 KHz) intermittent noise with an intensity of about 120

dB were sufficiently promising. Similarly, results on the behavioural studies through remote sensing system indicated that untrasound unit installed 2 to 3 M distance repelled rats for 2 to 3 days.

Hence, taking advantage of these behavioural studies, a new integrated approach of setting eco-safe traps with ultrasonic repeller was carried out in an acquarium (area 20 sq. mts) infested by *R. rattus* in a zoological garden. Two ultrasonic repellers were installed on the wall at a height of 3 m. above ground level about 2 to 3 M (radius) away from infested area. Eight eco-safe traps were placed under cover, inside card both stations, along walls and on rat runs. Rats, when scared and diverted by ultrasound, in the processing of running away were trapped near rat runs and also while hiding under cover and getting inside the card board stations. A total number of 13 *R. rattus* along with 3 sub-adults were trapped. Further, rodent proofing of the environment resulted in control of rats.

Laboratory Evaluation of Bromadiolone Tracking Powder Against *Bandicota bengalensis*

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Rodents can easily distinguish the harmful and harmless food by their acute sense of olfaction and sharp learning ability. The intelligence of rodents makes several problems in making poison baits, and the tracking powders appears to be more effective alternative to use with other control methods to get desirable success. Bromadiolone tracking powder (0.01%) was prepared from the bromadiolone of 0.25% concentrate manufactured by Pest Control (India) Ltd., Bombay.

Duri g the present study, the bromadiolone tracking powder (0.01%) was evaluated against two groups of *Bandicota bengalensis* viz., adult and sub adult groups. In pen experiments, the runway was treated with 2g of bromadiolone tracking powder (0.01%). The adult groups (5 male and 5 female) yielded cent percent mortality. Whereas, sub adult groups (5 male and 5 female) got 60% mortality. The days to death varied from 4 to 7 dyas. No significant difference was observed between the mortality of male and female groups. From the results of this study, it is inferred that the adult *B. bengalensis* are suceptible to the toxic effects of bromadiolone tracking powder (0.01%) and hence it may be effectively used with other control methods to control *B. bengalensis.*

Observations on Littering of Cutch Rock-rat, *Cremnomys cutchicus* in Residential Buildings

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On 7.2.96 morning, while I was working in my office at Jhadol, I heard some shrill in my room but the source of sound remained obscure. After a futile search, I left further probe into the matter. After a lapse of few hours, when I pulled out the upper most drawer of my table, I was surprised to see two pinkish, furless and blind youngones ratlings present beneath a paper which were making shrill like sound. I weighed them on a portable balance. They weighed 6 gms each and total length was 77 & 78 mm, respectively. To capture the mother, I kept three cages in the room and kept the drawer half opened. After few hours effort, I succeeded in capturing a female *Cremnomys cutchicus*. Obviously, it was the mother of the ratlings. After identification, I made it free immediately. I observed it entering the drawer many times during next few days.

The present observation are not worthy due to two reasons :

(a) Presence of *C. cutchicus* in the house is a quite new behaviour as it is considered as a wild fauna inhabiting rock crevices in its natural habitat.

(b) Instead of littering in rock cervices, it selected drawer of a table for the purpose, again quite an abnormal behaviour.

* Pest Control (India) Ltd., 28, Errabalu st. Madras-1

Salient Achievements of AICRP on Rodent Control (1995-96)*

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Survey and surveillance of rodent pests at different centres revealed that the soft-furred field rat, *Millardia meltada*, Lesser bandicoot rat, *Bandicota bengalensis* and Indian gerbil, *Tatera indica* constituted major pest complex in most of agroecosystems of the country. Of them, *B. bengalensis* continued to be the most serious rodent pest of national status. At a time, 3-4 generations of this species have been recorded in a burrow system under field conditions. Besides these, some species of field mice were also encountered in crop fields, for example, *Mus booduga* in rice-wheat cropping system of M.P., rice in coastal A.P., irrigated crops of Punjab, Rajasthan, U.P. and fruit orchards of H.P. Similarly, Brown-spiny field mice (*Mus platythrix*) was recorded from northern zone of Karnataka and fruit orchards of H.P. Common house rat, *Rattus rattus* was reported to inhabit irrigated crop fields in M.P., Rajasthan and apple orchards in H.P. Interestingly, Indian bush rat, *Golunda ellioti* accounted for more than 15% of rodent pest fauna in Plum and peach orchard of Himchal Pradesh, Indian crested porcupine, *Hystrix indica* was also observed infesting the vegetable crops in H.P.

Sunflower and maize suffered maximum losses due to rodents (*T. indica and M. Meltada*) at seedling stage of the crop in Karnataka, whereas, soyabean and groundnut suffered collosal damage at pod formation and harvest and post harvest stages. Similarly, maximum damage was caused in ragi at earhead formation and maturity stages. In the Kymore plateau and Satpura hill region, M.P., rice crop harboured maximum rodent infestation at preharvest stage. Intensity of infestation was highest on the bunds followed by fields and border areas. In apple, plum and pecan nut orchards of H.P., rodent infestation was significantly more during August-September months and at a low level during winter period. Observations during *kharif* and *rabi* seasons revealed that trapability of *B. bengalensis* was lower than that of *M. meltada* in M.P. During September-October and February-March, high rodent activity was observed, which coincides with the maturity of *kharif* and *rabi* crops, respectively. Infestation of pomegranate and *Ziziphus* orchards by Five striped squirrel, *Funambulus pennanti* starts with the orset of fruit setting, but maximum damage could be observed at fruit ripening stage.

Extent of rodent damage to different crops remained at par with that of previous years. The pests damages 4.7-17.7 pods/m^2 and 0.43-15.77 tillers/m^2 in gram and wheat crop, respectively in M.P. The areas with two cropping systems experienced more attack than those of monocropping. In arid region of Rajasthan and parts of Gujarat, *kharif* crops experienced non-significant rodent infestation due to heavy rains during 1996 and availability of green grasses and weeds in plenty all around. In Himachal Pradesh, vegetable crops, viz., cabbage, cauliflower and pea suffered 4.1, 3.4-8.3 and 4.2-5.2% damage, respectively. In another study, porcupine was observed to cause 50% damage to cabbage heads. Among fruit crops, apple suffered 6.7-21.5% damage at nursery stage, 4.4% damage during storage and young plants of pecan nut recorded 6.5% rodent damage. Hoarding losses due to rodents was to the tune of 1.5-24.8 kg/ha in potato and 1.25 kg/burrow in tomato crops. Summer groundnut was damaged to the extent of 2.5-4.0% in Saurashtra region of Gujarat. Effect of rodent damage to the quality of sugarcane indicated loss in extraction (6.17-17.46%) but no specific trend could be noticed. preliminary studies on damage assessment of different sugarcane varieties at Lucknow, revealed that CoLK 8102 variety is tolerant to rodent attack. This could be apparently due to hardness of the canes.

Rodent damage to oyster mushroom (*Pleurotus* sp.) in NEH region was recorded by the shillong centre. This damage could cause an estimated loss of Rs. 35 to 40 per kg. *Bandicota bengalensis* was responsible for the damage to oyster mushrooms. Similarly, rodents inflicted serious damage to honey combs in bee keeping in Meghalaya.

Laboratory and field evaluation of some second generation anticogulant rodenticides revealed that difethialone, a new rodenticide, had great promise as a single dose anticoagulant. This compound at 0.0025% yielded cent percent mortality against *B. bengalensis, R. rattus* and *T. indica, Golunda ellioti* and *M. musculus* in 1-2 day no-choice as well as choice tests. It was equally effective to manage both the sexes of rodents in laboratory trials. Among subacute rodenticides, cholecalciferol too yielded 100% kill of *B. bengalensis* at Bangalore but the days to death is of quite prolonged (20.5-39.0 days). Maruteru centre has evolved an action plan for containing the rodent menace in rice, coconut and rice-pulse cropping systems. Zinc phosphide (2.5%) followed by aluminium phosphide fumigation resulted in 86.0% control success in apple orchards. Similar success rate was achieved in plum orchards also

* Excerpts from Project coordinator's Report presented in the IX Group Meeting of AICRP on Rodent Control, held at UAS Bangalore, January 9-11, 1997.

by giving one treatment of aluminium phosphide followed by zinc phosphide (2.5%) burrow baiting. It was generally observed that burrow baiting is superior over surface baiting. In wheat and gram crops, difethialone, bromadiolone and zinc phosphide treatments yielded significant control success in M.P. Shillong centre reported maize strains spawn based zinc phosphide bait was preferred by *B. bengalensis* over rice based bait and bromadiolone wax cakes and accounted for 100% control success in oyster mushroom houses. Racumin (0.75%) was effective against house rats, house mice and bandicoots as tracking powder as well as poison bait. Regular live trapping, as part of non-toxic management approach, was tried in plum orchards in H.P. This method yielded 64.29, 62.5 and 50.0% reduction in population of *B. bengalensis*, other rats and mice, respectively. Jodhpur centre has developed a rodent management schedule for dry land crops

Technology assessment and refinement work is being taken up by all the centres of AICRP as coordinated trial under Social Engineering Activity. This activity has been able to develop greater awareness about rodent management among farmers in adopted villages. The cooperating centres have developed an excellent network of Social Engineering Activity on Rodent Control.

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

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