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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ALL INDIA COORDINATED RESEARCH PROJECT ON RODENT CONTROL

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CONTENTS

Relative Abundance of Field Rodents on the Aravallis

ISHWAR PRAKASH, PARTAP SINGH AND A. SARAVANAN

Desert Regional Station, Zoological Survey of India, Jodhpur – 342 009

Intensive trapping of small mammals for 2,50,200 trap hours on the Aravalli ranges during 1993 yielded 753 specimens of two insectivores (*Suncus murinus sindensis and S. stoliczkanus*) and 12 rodent species. On the foot hills, their relative abundance was found to be of following order :*Tatera indica, Golunda ellioti, Millardia meltada, Mus saxicola, M. phillipsi, M. terricolor, Bandicota bengalensis* and *Vandeleuria oleracea*. Major rodent fauna at 500 m elevation was constituted by *Cremnomys cutchicus, M. phillipsi* and *F. pennanti*, in that order of abundance. At 1000 m altitude, *Cremnomys cutchicus medius* was found to be the most abundant species followed by *M. phillipsi, F. pennanti, G. ellioti* and *M. saxicola*; at 1600 m altitude the abundance was of similar nature. An overall scenario of relative abundance of rodents is largely pre-dominated by *Cremnomys cutchicus* and *Golunda ellioti*.

In brief, the habita it occupancy of various rodent species in Aravallis in accordance with their relative numbers was found to be :

Scrubland	:	*Tatera indica, Golunda, ellioti, Funambulus pennanti, Millardia meltada, Mus platythrix, Vandeleuria oleracea* and *Mus terricolor.*
Rocky with dense vegetation	:	*F. pennanti, Cremnomys cutchicus, Mus saxicola and Mus phillipsi.*
Rocky with sparse vegetation	:	*C. cutchicus, F. pennanti and M. phillipsi.*
Crop field	:	*G. ellioti, Rattus rattus, M. meltada, T. indica and B. bengalensis.*
Runnel	:	*C. cutchicus, G. ellioti, and F. pennanti.*
River bank	:	*T. indica, M. meltada and G. ellioti.*
Hill-top grassland	:	*C. cutchicus and M. saxicola.*

V. oleracea and *M. terricolor* are being reported for the first time from the Abu hill

Changes in Rodent Species Richness in Aravallis Over a Century

ISHWAR PRAKASH, A. SARAVANAN AND PARTAP SINGH

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Early during this century, mammals were collected by Mr. Crump at Mount Abu close to the highest peak of the Aravalli range. The results were published as the Report No. 12 of Bombay Natural History Society's mammal Survey in its journal in 1913. The collector had recorded extensive field notes on various mammals. After about 90 years, we collected small mammals from Aravalli range and have compared their predominance with that recorded almost a century ago.

The old field notes made by Mr. Crump reveal that the Northern five-striped squirrel, *Funambulus pennanti* was plentiful in the Mount Abu region whereas we did not find it in abundance. The Indian gerbils, *Tatera indica* were quite rare in the vicinity of Oriya (1600 metre altitude). But in the same general locality, we trapped them fairly in abundance especially in the crop fields and runnels. Likewise, only few house rats, *Rattus r. alexendrinus* were collected by Mr. Crump whereas in our collection at Mt. Abu, their proportion was about 9 per cent of total rodent numbers. Most of them were trapped in crop fields. Surprisingly a large number of crevice dwelling rock rats, *Cremnomys cutchicus medius,* which is the most abundant rodent species on this hilly track; were trapped in the crop fields. This small nocturnal rodent has taken to dwelling in loosely pied stone walls around the fields instead of rock crevices, a case of niche alteration. The bush rat, *Golunda ellioti gujerati*,the lesser bandicoot, *Bandicota bengalensis* were earlier reported to be common and rare. However, our trapping results reveal them to be very abundant and common. Surprisingly, the insectivore, the house shrew, *Suncus murinus sindensis* which was reported to be rare at Mount Abu a century ago was found to be very abundant during our survey, only second to *Cremonomys cutchicus* in relative abundance.

It is observed that there is not much of a difference in the number of species recorded between the two periods of report but a significant difference is observed in their relative abundance. The major causative processes in bringing about these changes are probably, the merciless felling of trees, over-grazing by the livestock and phenomenal increase in irrigated agriculture.

Crop field scattered every where at Mount Abu is the most species rich habitat, and this is true at every altitude and locality we have studied on the Aravalli range. The availability of conducive survival conditions for rodents due to man's intervention in the environment has significantly altered their abundance in this hilly ecosystem.

Rodent Species Diversity on the Aravalli Range

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Small mammals were snap-trapped every month on the Aravalli range during 1993 and 1994. The computed results indicated that the species diversity is strongly and positively correlated with species richness with respect to 21 habitats, 8 pooled localities and 4 pooled altitudes (Kendall's Tau = 0.8691 ; P 0.001). Alpha diversity index, ranging from 2.95 to 0.79, for the eight pooled localities has permitted us to identify that Abu Road exhibits significantly greater species diversity than either Kodra dam or Gomukh; and that Anadra has significantly greater diversity than Gomukh.Beta diversity (An index of the extent of similarity in species composition between a pair of habitats or localities) computation expressed through Morishita-Horn index has revealed that Kodra dam and Gomukh are similar to each other and are very different from all other six localities as far as species diversity is concerned. A comparison of species diversity for four altitudes revealed that 500 m is very different from all other altitudes. Foothills and 1500-1600 m altitudes were found to be very close to each other in respect of rodent species diversity.

Rattus meltada, A Predominant Rodent Pest of Jagtial Region of Karimnagar District (A.P.)

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Survey conducted in and around Jagtial region of Karimnagar district of Andhra Pradesh indicated that rodents cause damage to the tune of

5-10% to standing rice, 5% to groundnut and 1-2% to chillies and other vegetable crops. The identity of rodent species present in the region was not known. Trapping of field rodents was done with wooden cage traps for two months, March-April, 1994, at the Regional Agricultural Research Station, Jagtial, Arpapally and Gullapeta villages in different cropping systems. A total of 57, 43 and 29 rodents were trapped at the respective trapping sites and all were identified as soft-furred-field rat, *Rattus meltada*. Therefore, it is concluded that it is one of the predominant rodent pest of crops in the region.

Prevalence of Rat Flea, *Xenopsylla astia* and Lice, *Polyplax stephensi* in the Indian Gerbil, *Tatera indica*

MOHD. IDRIS

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Monthly survey of fleas and other ectoparasites of Indian gerbil, *T. indica* were carried out around Jodhpur in the year 1990. The live trapped gerbils were individually covered with canvas bags and brought to laboratory. The gerbil were removed from the trap one by one, identified, sexed and combed for collection of ectoparasites. The traps and bags were also examined for ectoparasites, if any. Collected samples of ectoparasites preserved in tubes containing 70% alcohol and sent to National Institute of Virology (NIV) Pune for identification.

A species of flea, *Xenopsylla astia* and a lice species, *Polyplax stephensi* were identified. Females out numbered the males of both the ectoparasites i.e. 342 male and 499 females of *X. astia* and 342 males and 635 females of lice *P. stephensi*. Monthly population density index was worked out on the basis of total number of ectoparasites divided by total number of hosts. The overall specific index of the flea and lice species was 7.00 and 10.04 respectively. Monthly observations indicated that the frequency of occurrence of fleas was higher from March to July. However, in case of lice, *P. stephensi* the intensity of occurrence was high throughout the year except November to January (Table 1).

Table 1 Monthwise frequency of occurrence of the ectoparasites (Mean ± S.E.) of Indian gerbil, *Tatera indica*

Month	*Xenopsylla astia*			*Polyplax stephensi*		
	Male	Female	Index	Male	Female	Index
January	0.70 ± 0.34	1.66 ± 0.95	2.80 ± 0.89	2.80 ± 0.89	2.10 ± 0.75	4.90 ± 1.51
February	1.70 ± 0.59	3.10 ± 0.90	5.33 ± 0.98	4.50 ± 1.36	5.70 ± 1.54	10.10 ± 2.73
March	7.40 ± 1.12	10.80 ± 1.78	18.30 ± 1.88	6.10 ± 2.29	7.45 ± 1.31	12.58 ± 2.67
April	2.10 ± 0.64	6.40 ± 0.95	8.50 ± 1.39	4.50 ± 1.40	6.40 ± 1.31	11.00 ± 2.64
May	6.30 ± 1.61	7.54 ± 1.14	14.63 ± 2.63	2.10 ± 0.79	6.00 ± 0.92	8.10 ± 1.53
June	8.22 ± 2.52	4.70 ± 1.11	7.70 ± 1.72	4.40 ± 1.53	5.40 ± 1.54	10.90 ± 2.90
July	1.30 ± 0.44	4.50 ± 1.01	5.80 ± 1.00	4.88 ± 1.20	8.30 ± 1.31	13.50 ± 2.29
August	2.09 ± 0.87	3.70 ± 1.20	5.70 ± 2.04	4.50 ± 1.08	8.40 ± 1.99	10.70 ± 2.33
September	0.70 ± 0.26	2.30 ± 0.99	3.00 ± 1.21	4.40 ± 1.60	8.10 ± 3.05	10.40 ± 3.67
October	1.30 ± 0.47	2.20 ± 0.55	3.50 ± 0.75	3.54 ± 1.05	5.70 ± 1.03	9.20 ± 1.84
November	1.80 ± 1.04	2.40 ± 0.87	4.00 ± 1.87	1.80 ± 0.46	2.20 ± 0.86	4.44 ± 1.24

Impact of Bund Dimensions on the Rodent Infestation

PARMESH KUMAR, S.C. PASAHAN, V.P. SABHLOK AND R.K. SINGHAL

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Bunds generally provide permanent site for the rodent abode. Since the bunds greatly vary in height and thickness, the bund size, exents a great impact on the rodent infestation. Endeavour was thus made to establish

a relationship between the bund size and the intensity of rodent infestation. Fifteen bunds of different dimensions were randomly selected in each of the four vegetable crops i.e. bottlegourd, muskmelon, spongegourd and the cucumber crop. Rodent infestation was computed as the number of live burrows/10m at different developmental stages of the crop i.e. seedling, growth, flowering and maturity.

The data collected revealed that the correlation between the infestation and the bund width; infestation and the bund height; and the infestation and the bund volume was significant at all the development stages of the vegetable crops. These results clearly indicate that the bund dimensions should be kept minimum which will discourage the rodents to prepare extensive burrows.

Observations on Depredation of Neem tree, *Azadirachta indica* by squirrel, *Funambulus pennanti* under Arid Environment

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Neem tree, as whole, is being used as medicinal plant from early civilization. Nowadays, it is not only used for medicinal purposes but also as effective nonchemical toxicant like insecticides, herbicides, fungicides etc. Recent researches have revealed that the oil/flower/stem bark/leaves of Neem (*Azadirachta indica*) were showing, the antifertility effects in male gerbils/rats and in case of females when administered seed oil (200 mg/day) caused 75-100% foetal loss within 1-7 days.

Our observations during Jan-March 1995 indicated squirrel (*Funambulus pennanti*) damage to neem trees at Central Research farm of CAZRI Jodhpur. Squirrels were observed to debark the branches of neem trees to the tune of 7-12% within three months. Extensively debarked branches later dried up due to complete damage of xylem tisues. Debarking activity of squirrels to the neem tree was observed for the first time, however this activity is frequently noticed in several tree species viz. *Prosopis juliflora, Parkinsonia, Acacia, tortilis* etc by gerbils (*M. hurrianae* and *T. indica*) and porcupines *Hystrix indica*) in arid areas.

Porcupine Damage in Potato Fields at Shillaroo in Himachal Pradesh

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During a survey conducted for the potato tuber moth damage assessment for stored potato in August 1991, severe damage by Indian porcupine, *Hystrix indica* Kerr was noticed in the potato fields at Shillaroo in Himachal Pradesh. These potato fields were adjacent to forest. Damage symptoms were peculiar. At first sight, it appeared that the field has been harvested by farmers but closer investigations revealed that the damage was done by the porcupines. Furrows and ridges were parralleled and tubers were eaten. Inquiries with local farmers revealed that in this area porcupine has become a pest and often causes serious loss to potato.

Estimation of Rodent Losses at Threshing Floors

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Eight villages (Table 1) around Jabalpur were selected to study the hoarding losses in wheat due to rodents in the threshing floors. Approximate area of each threshing floor under study ranged from 0.04 to 0.32/ha in different villages. Five live burrows were randomly excavated on the threshing floor in each village. The weight of grain hoarded per burrow was recorded and the losses at threshing floor in villages were estimated.

Table 1. Hoarding loss on threshing floor in wheat due to rodents

Village	Mean of* hoarded wheat/burrow (g)	No. of threshing floor/village	Estimated hoarding loss/village (kg)
Barela	225.59	22	4.95
Dhanpuri	99.20	17	1.68
Tewar	200.14	31	6.20
Kudan	197.00	16	3.15
Bheeta	13.30	9	0.11
Khirkaheda	121.51	20	2.43
Padariya	126.18	10	1.26
Bamnodo	58.46	6	0.35

* Mean of 5 burrows

1 National Research Centre for Weed Sciences, Maharajpur, Adhartal, Jabalpur 482 004

All the burrows excavated contained hoarded materia. The weight of hoarded material per burrow ranged from 13.30 to 225.59 g. The loss to wheat due to hoarding by rodents on threshing floor was found maximum (6.20kg) in Tewar and minimum (0.11 Kg) in Bheeta village (Table 1).

Efficacy of Live Trapping for the Rodent Management in Vegetable Crops

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Rodents inflict substantial losses to the summer vegetable crops. Therefore, an attempt was made to evaluate the efficacy of the live trapping for the rodent management in vegetable crops in and around Hisar. Three different plots measuring one acre area each were selected randomly in each vegetable crop. Wonder traps were laid in a grid pattern at an interval of 15 m and the rodents were trapped live continuously for three days. It was preceded by 2 days pre-baiting. This was repeated at an interval of 15 days throughout the crop existence. The efficacy of the treatment was evaluated by obtaining pre and post-treatment bait census (BT), live burrow census (BC) and the track marking census (TM). The rodent damage was assessed in treated and control plots.

Table 1. Efficacy of live trapping for rodent control in vegetable crops.

Crop	BC reduction % (a) Mean ± S.E.	BT reduction & (b) Mean ± S.E.	TM reduction % (c) Mean ± S.E.	Estimated reduction % (a+b+c)/3 Mean ± S.E.
Bottlegourd	48.15± 1.25	55.03± 2.87	50.35± 1.06	51.18± 2.78
Muskmelon	45.59± 2.48	49.89± 1.13	48.16± 0.94	47.88± 2.08
Spongegourd	49.21± 1.88	56.56± 2.04	50.60± 1.98	52.12± 1.50
Cucumber	47.43± 1.95	52.21± 4.97	49.51± 1.82	49.72± 1.77

BC, burrow census ; BT, bait census; TM, track marking census

Table 2 Damage reduction in the vegetable crops proceeding live trapping

Crop	Percent damage Mean± S.E.		Yield loss (q/ha) Mean± S.E.		Yield loss saved (q/ha) Mean± S.E.
	Treated	Control	treated	Control	
Bottlegourd	6.92± 0.54	14.32± 0.28*	17.11± 1.25	35.78± 1.01*	18.67± 2.26
Muskmelon	5.87± 0.60	11.40± 0.31*	9.12± 0.74	18.24± 0.44*	9.12± 0.59
Spongegourd	4.68± 0.61	9.85± 0.45*	8.33± 1.01	17.73± 0.48*	9.40± 0.53
Cucumber	4.44± 0.76	8.96± 0.41*	6.02± 1.07	12.54± 0.25*	6.52± 0.83

* t significant at 1% level of significance.

The live trapping of the rodents resulted in reduction in rodent activity to the tune of 51.18, 47.88, 52.12 and 49.70% in bottlegourd, muskmelon spongegourd and the cucumber crops respectively (Table 1). While the rodent damage was calculated to be 6.92, 5.87, 4.68 and 4.44% in the treated fields of all the four crops respectively. This was significantly lower (P) than that computed in their respective control fields i.e. 14.32, 11.40, 9.85 and 8.96% (Table 2). Consequently, the mean yield loss too was appraised to be significantly lower (P) in the treated fields. This clearly revealed that 18.67, 9.12, 9.40 and 6.52 q/ha of the respective produce could be saved through the live trapping.

Toxicity of *Jatropha curcus* Against *Rattus rattus*

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Jatropha curcus Linn. (family Euphorbiaceae) is commonly called as "Rata jyote" in Hindi speaking area. It is a semi wild shrub, widely distributed in tropical regions. It is reported that the plant shows highly toxic properties against mammals and has been used in some parts of tropical regions to treat cancerous growths. A preliminary screening of *J. curcus* seeds was done under laboratory conditions against common house rat, *Rattus rattus*.

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In the beginning, wet grains of wheat and seeds of *J. curcus* were provided to rats to test the preference but rats did not show any preference towards *J. curcus* seeds. In no choice test, complete seeds of *J. curcus* were offered to rats. In control, only wet grains of wheat were given. It was observed that after consumption of 3-5 seeds/rat, rats died within 3-8 days while in control no mortality occurred. In other experiment, crude powder of *J. curcus* seeds was provided to rats in no choice test and same results were obtained. It is interesting to observe that although there is pleasant smell from the seeds as well as powder of *J. curcus* yet rats did not show any preference as a food. Further work is in progress.

Survey of Rodent Menace and Their Control in the Residential Areas

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Forty families residing at Dairy Farm of the University representing a typical rural residential environment were surveyed by the undergraduate students of Home Sciences with the help of structured schedules. The objective of the survey was to collect information on the knowledge and awareness of the local residents about rodent pests and their management.

All the families were found to be well aware of the two rodent species inhabiting the residential premises (*Rattus rattus* and *Mus musculus*). Some of the families reported occurrence of mole rats (*Bandicota bengalensis*) too in and around their houses. They had serious problems of the rodent menace in their houses. The study revealed that most of the subjects use closed drums and iron containers for storing the food materials. Although not aware of the name of rodent poison 42.5% of respondents were using the poison and name its as black powder, whereas, half of them used mechanical means. A small proportion (5%) was against the rodent killing due to social taboos. The families using rodent poison were not aware of secondary poisoning and disposed off the dead rodents in open fields. Majority of the subjects were of the opinion that biological method like use of cats can only control the pests upto certain limits and provide a temporary relief. The houses, where poison baits were used for rodent control, the elder members were found to be very cautious in preparation and placement of baits and took several safety measures. Wheat flour was a prefrence of 75% families for preparation of poison bait. It was generally agreed by all the respondents that rodent control can be more effective and successful if the control operations are adopted on a whole village or mohalla basis.

On the basis of survey reports it has been established that most of the families were a ware of the commensal rodents, their damage and control methods to a certain extent. However, socio-religious taboos and want of proper technical know-how regarding rodent control was a major constraint in the successful implementation of the control operations. Interestingly, most of the housewives were very anxious and enthusiastic in adopting the rodent control practices to get rid of this problem. It is, therefore, advised that extension and training programmes on rodent pest control should be properly strengthened by State/Central Department and Non-Governmental Agencies.

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Recommendations of VIII Group Meeting For Rodent Management Technology

After detailed discussion during the VIII Group Meeting of AICRP on Rodent Control held at Junagadh, from Dec. 29-31, 1994 following recommendation were made, which may form a comprehensive schedule for different cropping systems, threshing floors and grain stores for management of rodent pests.

(1) Rodenticides and their dosages :

i. Zinc phosphide 2.0 - 2.5% w/w bait

ii. Bromadiolone - 0.005% loose bait or wax cake

iii. Aluminium phosphide - a burrow fumigant : It is generally recommended for the effective control of residual rodent population in crop fields. For its effectiveness, enough soil moistures should be available so that letha phosphine gas is liberated in the burrows.

As per the decisions of the Central Insecticide Board and Registration Committee, aluminium phosphide would now be available for open sale in a new trilaminated LDPE/Aluminium paper pouch of 5.0 g packing. A 5.0 g pouch per burrow is being approved for burrow fumigation. It is recommended for the management of residual rodent population in the crop fields and threshing floors only.

(2) Schedule for lean periods :

During May/June and October/November i.e. just before sowing or planting of the field crops, burrow baiting with zinc phosphide (2%) followed by bromadiolone (0.005%) should be adopted.

(3) Schedule for crops :

(a) Paddy, wheat, jowar, millets, sugarcane, pulses, oilseeds, vegetable crops

i. *Zinc phosphide :* (a) Prebaiting with plain bait (10-15 g pre bait per burrow) is done to preceed poison baiting. 2.0-2.5% zinc phosphide bait to be placed inside the live burrow (@ 6-10 g per burrow). Bait should be prepared using commonly grown cereal and edible oil of the area.

(b) Since residual rodent population develop bait shyness after one baiting with zinc phosphide, a minimum of 50-60 days gap should be given before it is used again.

(c) For residual rodent population, bromadiolone (0.005%) baiting should be done @ 15 g bait per live burrow.

OR

ii. *Bromadiolone :* 0.005% bromadiolone bait (10-15 g or 1 cake per burrow) to be placed inside the live burrows or in the bait stations. Since there is no problem of bait shyness in rodents due to this poison, the baiting with bromadiolone may be repeated after 15 days for the control of residual rodent population.

Timings for control operation in field crops

First treatment - before sowing for all crops.

Rice : August

Wheat : Mid February/early March/at first at milky stage a second after 15 days of first application.

Groundnut : Two treatments of bromadiolone (0.005%) - fi at pod formation stage and repeat after 15 d

Sugarcane : July-August and repeat in Oct. Nov.

Vegetable Crops : Damage initiation stage.

(4) *Coconut palms*

i. Place 2 cakes of 0.005% bromadiolone each on eit side at the base in the bunch bearing tender n
ii. Repeat after 15 days on palms where fresh nut is noticed.

(5) *Cocoa*

i. Place 2-4 cakes of 0.005% bromadiolone on the fc of pod bearing branches. Bait station should prefer be secured to the branches.
ii. Whenever cocoa is intercropped with coconut, b crops should be treated simultaneously.

(6) *Threshing floors*

i. Place 10-15 g plain bait in the live burrows follow it up with zinc phosphide (2.0 - 2.5%
ii. Bromadiolone baiting after 15 days for residual roc population.

OR

Bromadiolone (0.005%) poison baiting and re after 15 days if rodent activity is visible.

(7) *Grain stores*

Bromadiolone (0.005%) wax block or loose bait to be kept in the station in the areas of maximum rodent activity. Trapping inside the st may also be resorted. Later on grain stores should be made rodent p after controlling the rodents once. Bromadiolone (0.005%) baitings ma repeated, as and when desired.

NOTES AND NEWS

Dr. (Mrs.) Shakuntala Sridhara, Associate Professor, has taken over the charge of Principal Investigator of Bangalore Cooperating Centre, AICRP on Rodent Control at Department of Vertebrate Biology, University of Agricultural Sciences, GKVK Campus, Bangalore 560-065.

Dr. Parmesh Kumar was awarded Doctorate degree for his Thesis entitled "Ecology and management of rodents in some vegetable crops in and around Hisar" under the chairmanship of Dr. S.C. Pasahan from C.C.S. Haryana Agricultural University, Hisar.

Mr. R.K. Singhal submitted his Ph.D. Thesis entitled "Management of field rodents in some major crops in and around Hisar" under the chairmanship of Dr. S.C. Pasahan at Department of Zoology, C.C.S. Haryana Agricultural University, Hisar.

Dr. Mohd. Idris attended a two weeks short-term course on "Use of Computers in Agriculture Research" from June 12-27, 1995 organised under the aegies of National Agricultural Research Project at Indian Agricultural Statistics Research Institute, New Delhi 110 012.

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

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