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2009

New India Publishing Agency
Pitam Pura, New Delhi- 110 088

Published by
Sumit Pal Jain *for*
New India Publishing Agency
101, Vikas Surya Plaza, CU Block, L.S.C. Mkt.,
Pitam Pura, New Delhi- 110 088, (India)
Phone: 011-27341717, Fax: 011-27341616
E-mail: newindiapublishingagency@gmail.com
Web: www.bookfactoryindia.com

'Procedings of 31st Annual Conference of Ethological Sociey of India-2007'
Sponsored by Ethological Society of India

ISBN : 978-81-89422-54-7

Typeset at: Laxmi Art Creations, Delhi
Printed at: Jai Bharat Printing Press, Delhi

Dedicated

to

Late Prof. B. R. Seshachar

First President of Ethological Society of India

of Entomological Research, Indian Agricultural Research Institute, New Delhi November 5-7, 2003 pp.26.

Mote U. N., A. P. Mohite & G. R. Lolage. 1995. Seed treatment of imidacloprid against sorghum shoot fly. *Pestology* 19:37-40.

Panchbhavi, K. S. & Y. K. Kotikal. 1992. Effect of seed soaking in insecticide solution on the germination and on the incidence of shoot fly. *Curr. Res.* 21:29-30.

Patil, B.V., M. Bheemanna, Somasekhar & S.C. Hiremath. 1992. Effect of seed soaking of insecticides on sorghum shoot fly, *Atherigona soccata* Rondani. *Indian J. Ent.* 54: 424-427.

Pawar, V. M., G. D. Jadhav & B. S. Kadam. 1984. Compatibility of Oncol 50 SP with different fungicides on sorghum (CS-3541) against shoot fly (*Atherigona soccata* Rondani). *Pesticides* 18:9-10.

Sharma, H. C. 1985. Strategies for pest control in sorghum in India. *Tropical Pest Management* 31:167.

Shivpuje, P. R. & P. A. Thombare. 1983. Efficacy of different insecticides for the control of sorghum shoot fly. *J. Maharashtra Agri. Univ.* 8:83.

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Eco-friendly Management of Rodent Pests Using Tanjore-bow Trap in Irrigated Rice Fields of Tiruchirappalli District Tamil Nadu

SAKTHIVEL, P., A. BHARATHIRAJA AND P. NEELANARAYANAN

ABSTRACT

Rodents are deemed to be the most destructive vertebrate pests of agricultural crops. Tanjore-bow trap is an inexpensive and eco-friendly tool for rodent management by farmers in Cauvery delta. In a portion of Cauvery delta of Tiruchirappalli district, field trials using traps to control rodent pests were conducted during two rice crop seasons, *viz.*, *Kuruvai* (July – September 2006) and *Samba* (October 2006- February 2007). During *Kuruvai* season 26 ha rice fields were subjected to the trials for 66 days and during *Samba* season 54 ha rice fields were covered for 79 days. The total number of trap nights during *Kuruvai* and *Samba* seasons' rice crop were 6440 (range/day-80 to 240) and 14746 (range/day -120 to 720), respectively. Three species of field rodents *viz.*, *Bandicota bengalensis*, *Millardia meltada*, and *Mus booduga* were trapped during both seasons of rice crop. More *B. bengalensis* were trapped than *M. meltada* and *M. booduga*

during both seasons. The percent trap success was found to be 15 during *Kuruvai* season and 16 during *Samba* season. The total amount spent by the farmers was Rs. 5162 for *Kuruvai* season and Rs. 12115 for *Samba* season. The cost of trapping a single rodent was computed to be Rs. 5 during both seasons. From the results of the present study, it can be suggested that trapping can be an effective method for controlling rice field rodents. It is also eco-friendly and non-hazardous.

INTRODUCTION

Rodents are by and large the most destructive vertebrate pests on earth. They are also deemed to be the principal foes of farmers since time immemorial. According to Malhi & Sheikher (1989), magnitude of rodent depredation is 10-15% of total national agricultural produce in India. Besides, they spread many diseases among humans and livestock and also destroy many household articles.

Rice is the staple food crop of *Cauvery* Delta, in Tamil Nadu and in addition pulses, plantain, soy bean, sugarcane, cotton, sesame etc., are cultivated. The crop fields are inhabited by the lesser bandicoot rat (*Bandicota bengalenis*), the soft-furred field rat (*Millardia meltada*) and the Indian field mouse (*Mus booduga*) while the Indian Gerbil (*Tatera indica*) inhabits the barren lands adjacent to the crop fields (Neelanarayanan *et al.*, 1996). All these rodent species cause damage to the cultivated crops. Management of these rodent pests is indispensable in places where the problem is acute.

Many rodentologists from different parts of our country have reported the magnitude of rodent depredation in different stages of various crops. The study made by Neelanarayanan (1997), in the *Cauvery* delta, revealed that paddy, pulses (Green gram and Black gram), sugarcane and cotton crops, during pre-harvest stage, suffered up to a maximum of 37%, 58%, 11% and 14% damage, respectively due to rodent pests. It is thus apparent that these vertebrate pests are constant threats to our country's food production and hence management of their population at below economic threshold levels in different crop fields is an urgent need. Our ancestors adapted simple, economic, effective and non-hazardous (to non-targets) control methods against them. However, the advent of rodenticides changed the attitudes of our farmers and chemicals replaced the traditional methods. When man began to use novel methods of rodent control like use of acute and chronic rodenticides and chemical fumigants, he was totally unaware of the dire consequences of these chemicals to his livestock and other non-target organisms.

In U.S.A., brodifacoum (a second generation chronic rodenticide) used for rats, house mice and vole control, affected the non-target species like barn owl, screech owl and other raptors through secondary poisoning (Hegdal & Blaskiewicz, 1984; Hegdal & Colvin, 1988). In India, Neelanarayanan *et al.*, (1994) reported the scope for secondary poisoning hazards of zinc phosphide (an acute rodenticide) to house crow and jungle crow. The indirect potential hazards of zinc phosphide to non-targets animals have been reported by Neelanarayanan & Kanakasabai (1995). In view of the side effects of rodenticides on the non-target animals and environment, scientists are searching for rodent control methods, which will not create any pollution on the ecosystem. To accomplish this objective an attempt has been made to study the efficacy of *Tanjore* bow trap in the crop fields and to contain the population of rodents and the results thereof are presented in this paper.

MATERIAL & METHODS

Tanjore bow-trap is an inexpensive and eco-friendly tool for rodent control but unfortunately many farmers of our country are unaware of it. Field trials of Tanjore bow traps to reduce rodent population was conducted in a portion of Cauvery delta in two rice crop seasons, *viz.*, *Kuruvai* (July – September 2006) and *Samba* (October 2006- February 2007). During *Kuruvai* season 26 ha rice fields were subjected to the trials for 66 days and during *Samba* season 54 ha rice fields were covered for 79 days. Experienced traditional rodent trapper(s) were hired for this purpose. The trapper(s) used (80-720/ day) *Tanjore* bow-traps according to the need and size of the crop fields. The trapper(s) placed the traps in the evening hours in a grid pattern at 2-5 m interval and left them overnight. Parched paddy and raw rice mixed with 1% coconut oil was used as a bait material to attract the rodents. The traps were planted over a tilted hill and on either side little quantity of the bait material was placed in order to entice the rodents to enter the trap. The hills around the trap were allowed to stand. This technique is said to improve the trapping efficiency (Neelanarayanan & Kanakasabai, 2000). The trapper(s) took nearly one to three hours to place all the traps inside the rice fields. The cost for trapping one rodent was then calculated to determine whether this technique is economical or not for the marginal and small-scale farmers and also to verify its applicability in future all over the country.

RESULTS & DISCUSSION

The number of rodents trapped using *Tanjore* bow-trap during *Kuruvai* season paddy crop month-wise and developmental stage-wise are provided in Tables 1 and 2, respectively. During *Kuruvai* season, the total number of *Tanjore* bow-traps set was 6,440. All the rodent species, that inhabit the rice fields *viz.*, *Bandicota bengalensis*, *Millardia meltada* and *Mus booduga* were trapped and killed by this method (Table 1). Of the three species, *B. bengalensis* was the predominant rodent pest of rice crop of our area and 838 of them were trapped. The number of other two species of rodents *viz.*, *M. meltada* and *M. booduga* trapped was 118 and 6, respectively (Tables 1 and 2). The overall mean trapping success in terms of percentage was 11.87, 15.17 and 17.69 during July, August and September 2006, respectively (Table 1). The mean percentage of trapping success was found to be higher during maturation stage (17.94) than milky (14.35) and vegetative stage (11.1) (Table 2).

Table 1. Number of rodents trapped using *Tanjore* bow-trap during *Kuruvai* Season paddy crop

Month & Year	*B. bengalensis*		*M. meltada*		*M. booduga*		Total number of traps set	Overall mean % of trapping success
	No. of murids trapped	Mean % of trapping success	No. of murids trapped	Mean % of trapping success	No. of murids trapped	Mean% of trapping success		
July 2006	120	10.75	26	2.16	0	0	1200	11.87
August 2006	356	12.11	80	2.82	3	1.5	3040	15.17
September 2006	362	21.58	12	1.24	3	0.41	2200	17.6
Total	838	14.81	118	6	0.63	6.440	15.2	44.64

Table 2. Number of rodents trapped using *Tanjore* bow-trap during different developmental stages of *Kuruvai* season paddy crop.

Developmental stages	*B. bengalensis*		*M. meltada*		*M. booduga*		Total.no of traps set	Overall Mean % of trapping success
	N.M.T[1]	Mean[2]	N.M.T[1]	Mean[2]	N.M.T[1]	Mean[2]		
Vegetative	170	11.25	22	2.1	-	-	1350	11.1
Milky	375	14.6	92	2.7	4	1.7	3200	14.35
Panicle formation	293	19.6	4	1.8	2	0.3	1890	17.94
Total	838	15.1	118	2.2	6	1	6440	14.46

[1] Number of murids trapped
[2] Mean percentage of trapping success

The trapped numbers of rodents using *Tanjore* bow-trap during *Samba* season paddy crop month-wise and developmental stage-wise are provided in Tables 3 and 4, respectively. Total number of traps set during this season was 14,746. Of the three inhabiting species, *B. bengalensis* was trapped to the tune of 2273 followed by *M. meltada* (36 nos.) and *M. booduga* (6 nos.). During *Samba* season largest number of traps was set during vegetative phase (5646) of the crop. However, mean percentage of trapping success was found to be higher during milky stage (17.18) followed by maturation (15.98) and vegetative (13.6) phases. Of the three months of trapping trials, January 2007 recorded maximum mean number of trapping success. Some local tribals are reported to eat trapped *B. bengalensis* and *M. meltada* and for them this is an important, high protein food supplement.

It is evident from the results that an increasing trend *i.e.*, more numbers of rodent trappings could be observed during successive developmental stages of the crop (from vegetative to maturation stage) and it might be due to the appearance and maturation of grains. Further, it is obvious from the results that this trap is to be used during the first three developmental stages of both seasons of the paddy crop in order to avoid major depredation due to rodent pests (Tables 1-4).

Table 3. Number of rodents trapped using *Tanjore* bow-trap during *Samba* season paddy crop.

Developmental stages	*B. bengalensis*		*M. meltada*		*M. booduga*		Total no. of traps set	Overall Mean% of Trapping success
	N.M.T[1]	Mean[2]	N.M.T[1]	Mean[2]	N.M.T[1]	Mean[2]		
December2006	1269	14.59	22	0.93	2	0.54	8646	14.61
January 2007	907	17.2	5	0.59	1	1.25	5220	17.3
February 2007	97	11.35	9	2.08	3	0.93	880	12.70
Total	2273	14.38	36	1.2	6	0.90	14,746	14.87

[1] Number of murids trapped
[2] Mean percentage of trapping success

The results of the *Tanjore* bow-trap-trapping trials in *Kuruvai* and *Samba* season paddy crop fields are presented in Table 5. During *Kuruvai*

season 26 ha rice fields were subjected to the trials for 66 days and during *Samba* season 54 ha rice fields were covered in 79 days. The total numbers of trap nights during Kuruvai and Samba seasons' rice crop were 6,440 (range/day-80 to 240) and 14,746 (range/day -120 to 720), respectively. Three species of field rodent pests *viz.*, *Bandicota bengalensis*, *Millardia meltada*, and *Mus booduga* were trapped during both seasons of rice crop. During both seasons *B. bengalensis* were trapped more in number followed by *M. meltada* and *M. booduga*. The percentage of trapping success was found to be 15 (*Kuruvai* season) and 16 (*Samba* season). The total amount spent by the farmers was Rs. 5162 for *Kuruvai* season and Rs. 12,115 for *Samba* season. The cost of trapping a single rodent was computed to be Rs. 5 during both seasons. From the results of the present study, it can be suggested that trapping can be an effective, eco-friendly method for controlling rice field rodents. Further, it should also be borne in mind that when the rodent density is high in the crop fields, the trapping efficiency would increase further, and that will significantly reduce the trapping cost per rodent. The results of the present study corroborate the findings of Neelanarayanan & Kankasabai (2000).

Table 4. Number of murids trapped using *Tanjore* bow-trap during different developmental stages of *Samba* season paddy crop.

Developmental stages	*B. bengalensis*		*M. meltada*		*M. booduga*		Total No of traps Set	Overall Mean % of Trapping success
	N.M.T[1]	Mean[2]	N.M.T	Mean[2]	N.M.T	Mean[2]		
Vegetative	759	13.31	20	0.94	1	0.25	5646	13.6
Milky	852	17.0	5	0.69	2	1.04	5180	17.18
Panicle formation	662	15.61	11	1.45	3	0.93	3920	15.98
Total	2273	15.30	36	1.02	6	0.74	14,746	15.58

[1] Number of murids trapped
[2] Mean percentage of trapping success

Therefore, it is deemed that this tool is a simple, economical and effective one to combat rodent menace in the crop fields. Further, with this method the traditional trappers of this area could be able to trap and kill as many as 3,277 rodents in two seasons of rice crop and earn Rs.17,727/-.

Table 5. Results of the trials of *Tanjore* bow-trap in *Kuruvai* and *Samba* season paddy

	Paddy Crop Seasons	
	Kuruvai	*Samba*
Months of Investigation	July - September 2006	December - February 2006- 07
Total Area Covered	26 ha	54 ha
Total No. of Trapping days	66	79
Total number of Traps set	6,440 (80 - 240) [1]	14,746 (120 - 720) [1]
Total no. of murids trapped	962 (0 - 43) [2]	2315 (5 - 117) [2]
No. of murids trapped /ha	37	43
Overall % of Trapping success	14.93	15.69
Rodent Species Composition (in numbers)		
B. bengalensis	804 (83.5%) [3]	2273 (98.18%) [3]
M. meltada	152 (15.8%) [4]	36 (1.55%) [4]
M. booduga	6 (0.62%) [5]	7 (0.30%) [5]
Total amount (in Rs.) earned by the trappers	Rs. 5612/- [6]	12,115/- [6]
Cost of each rodent trapped	Rs.5/-	Rs.5/-

1 Range values of total number of traps set/day
2 Range values of total number of animals trapped/day
3,4, 5 values within the parenthesis indicate the percentage of trapped rodent species composition
6 Earning has been calculated as follows: Rs.200/- for setting of 300 traps/day Rs. 1/- for every trapped rodent.

This method may very well be encouraged among peasant community. There is a large demand for the dried rodent-meat for livestock, poultry and fish for feeding. Besides, the rodent's skin has also proved to be good for making small leather products. Therefore, the trapped rodents may be used for these purposes.

It is suggested that the traditional *Tanjore* bow-trappers be identified by the Central and State agricultural personnel and Non-Governmental Organizations and be encouraged to practice this eco-friendly method. We sincerely hope that this kind of action will certainly help the marginal and small-scale farmers to a great extent to keep the rodent pests under check in their rice fields.

Advantages of this method: It requires less man power; it is a simple, economical and effective method; it does not affect the non-target animals, it is eco-friendly, it offers good trappability, all the ravaging rodent species are trapped and killed, the trapped rodents form a good source of protein for human beings, livestock etc. The number of dead

rodents is actually seen by the farmers, and it brings prosperity to the traditional trappers (Neelanarayanan & Kankasabai, 2000).

ACKNOWLEDGEMENTS

The authors are thankful to Dr. S. Ramalingam, Principal and Management of Nehru Memorial College (Autonomous) for having rendered necessary facilities. We are also thankful to the rodent trappers who helped us to trap the rodents for these experiments. The moral support and encouragement extended by Prof. K. Kanagasundari, H.O.D. of Zoology, Nehru Memorial College (Autonomous), Puthanampatti are gratefully acknowledged.

References

Hegdal, P. L. & R. W. Blaskiewiez. 1984. Evaluation of the potential hazard to barn owls of Talon (Broadifacoum bait) used to control rats and house mice. *Environ. Toxicol. Chem.*3: 167-179.

Hegdal, P. L. & B. A. Colvin. 1988. Potential hazard to eastern screech-owls and other raptors of Broadifacoum bait used for vole control in orchards. *Environ. Toxicol. Chem.* 7: 245-260.

Malhi, C. S. & Chander Sheikher. 1989. Some social and ecological considerations for rodent control in District Pauri of Garhwal Himalayas. *Tropic. Pest Manage.* 35(1):67-69.

Neelanarayanan, P. 1997. *Predatory pressure of Barn owl (Tyto alba stertens* Hartert, 1929) *on Rodent pests - A Field Evaluation*. Ph.D. Thesis, Bharathidasan University, Tiruchirappalli.

Neelanarayanan, P. & R. Kanakasabai. 1995. Effect of zinc phosphide on Intestine, Liver, Spleen and Kidney of *Millardia meltada* (Gray). *J. Ecobiol.* 7(2): 85-90.

IBID. 2000. Rodent Pest Management - A Traditional Approach. *Pestology* 24 (2): 12-19.

Neelanarayanan, P., R. Nagarajan & R. Kanakasabai. 1994. Possibility of secondary poisoning hazard to house crow, *Corvus splendens* and jungle crow, *Corvus macrorhynchos*. *Zoo's print* 9(5): 16.

IBID. 1996. Burrow morphology of field rodents. *J. Bombay Nat. Hist. Soc.* 93(2): 238-241.

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Efficacy of Herbal Products Against Pigeon Pea Pod Borers

NANDIHALLI, B. S.

ABSTRACT

The experiment on efficacy of three herbal products against pigeon pea pod borer carried out along with profenophos at Main Agricultural Research Station, Dharwad during 2005-06 indicated that among three herbal products Cristol 56 SL III was found effective in reducing the pod borer population with less pod borer damage and higher grain yield which was camparable with profenophos.

INTRODUCTION

Pigeon pea is an important pulse crop widely grown in the country. Among the pigeon pea growing states, Karnataka ranks fourth in area (4.4 lakh ha) and fifth in production (2.2 lakh tones) with a productivity of 541 kg/ha. Among many factors responsible for low yields of pigeon pea, insect pests are the major ones. Of these, the pod borers (*Helicoverpa armigera, Maruca testulalis*, etc.) are the most serious endemic pests. The pesticide usage on pigeon pea has been both extensive and intensive (Gour, 1993). This is evident from the fact that 4% of pesticide consumption is by pulses and out of which 80% is consumed by pigeon pea. This has lead to the problem of insecticide resistance resulting in failure of insecticide control programme.