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Rodent Control

EVALUATION OF LIQUID BRODIFACOU M AGAINST GERBILS AND RATS

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ABSTRACT

Liquid brodifacoum (0.005% concentration) was screened for the control of two gerbils, *Meriones hurrianae* and *Tatera indica* and two rats, *Rattus meltdada* and *Rattus rattus*. It was observed that the ingestion of liquid brodifacoum dropped on the second day in case of all the rodent species as compared to the first day but the difference was not statistically significant. 80 to 90 per cent rodents died after a single day baiting but 100 per cent success was achieved only after two days, except in a case of *T. indica* in which mortality was 90 per cent. Cent per cent succumbed only after the third day of poison ingestion. Comparison of available data revealed that out of the three formulations of brodifacoum, wax blocks are the most acceptable and effective followed by liquid formulation.

INTRODUCTION

Brodifacoum, a second generation anticoagulant rodenticide, is being evaluated for the control of desert rodents (Mathur and Prakash, 1981a; Soni and Prakash, 1984). The compound is reported to be fairly active as a single dose anticoagulant (Dubock and Kaukeinen, 1978), requires no pre-baiting (Rennison and Dubock, 1978) and has been found to be effective even for the warfarin resistant rodents (Greaves et al., 1973). This relatively — new rodenticide has also been found very efficient for the control of *T. indica*, *M. hurrianae*, *R. rattus* and *R. meltdada* (Mathur and Prakash, 1981; Soni and Prakash, 1984). The manufacturers have recently been come up with a liquid formulation of this compound which has been tested in this laboratory for the first time in India for the control of four rodent species and the results are being presented in this communication.

MATERIAL AND METHODS

The gerbil, *M. hurrianae*, *T. indica indica* and the soft-furred field-rat, *R. meltdada pallidior* were collected in crop fields around Jodhpur (Lat. 26° 18' N Long 73° 01' E); and the house rat, *R. rattus* from residential premises and provision stores. In every experiment equal number of healthy animals of both the sexes were housed individually in cages. Body weight of each animal was also recorded before and after the completion of each test.

During the conditioning period, water and pearl millet (*Pennisetum typhoides*) were provided *ad libitum* to the experimental animals. During the no-choice trials, however, water was replaced by liquid brodifacoum solution (0.005% concentration) but millet food was available. Tests were conducted for 1, 2 and 3 days with different groups of rodent. The

rate of evaporation poison accounted from the amount consumed by rodents.

RESULTS AND DISCUSSION

Acceptance of liquid brodifacoum: The ingestion of liquid brodifacoum by *M. hurrianae*, *T. indica*, *R. meltada* and *R. rattus* was found to be maximum on the first day as compared to that on 2 day. But the difference was not found to be significant in case of *M. hurrianae*, *T. indica* and *R. rattus* (student's $t = 1.00, 1.83$ and 0.83 respectively). However, in *R. meltada* ($t = 3.12, P < 0.001$, Table 1) this difference was found to be significant. The relative acceptance of the liquid brodifacoum per 100 g body weight was found to be maximum by *R. meltada*, 50.13% followed by *M. hurrianae* 26.04%, *T. indica* 13.95%, *R. rattus* 9.86%. In 2 days exposure, the order of ingestion by *R. meltada* was 42.25%, *M. hurrianae* 31.15%, *R. rattus* 12.29%, *T. indica* 9.34%.

TABLE — 2

RELATIVE TOXICITY OF THREE FORMS OF BRODIFACOUM AT 0.005% CONCENTRATION IN ONE DAY NO-CHOICE FEEDING

Species	Percent Mortality after consuming different formulation of brodifacoum		
	Powder in millet (0.005 %) (1)	Liquid formulation in water (0.005 %) (2)	Wax blocks (0.005 %) (3)
<i>M. hurrianae</i>	83.3	83.3	100
<i>T. indica</i>	90.0	90.0	100
<i>R. meltada</i>	80.0	81.8	80
<i>R. rattus</i>	83.3	90.0	—

Sources: 1. Soni, 1981. 2. Present study. 3. Unpublished.

TABLE — 1

SHOWING INGESTIBILITY AND EFFICACY OF LIQUID BRODIFACOUM AT 0.005% CONCENTRATION TO *M. HURRIANA*, *T. INDICA*, *R. MELTADA* AND *R. RATTUS* IN NO-CHOICE TESTS

Species	Exposure period (days)	Body weight (Mean ± S.E.)	Liquid position ingested ml. (Mean ± S.E.)	Acute ingredient ingested (mg/kg) (Mean ± S.E.)	Mortality	Days to death	
						Mean	(Range)
<i>M. hurrianae</i>	1.	78.91 ± 3.59	4.05 ± 0.18	2.64 ± 0.10	10/12	7.6	4-11
	2.	78.41 ± 2.64	8.22 ± 0.34	5.23 ± 0.32	12/12	7.2	4-10
<i>T. indica</i>	1.	134.50 ± 9.25	6.20 ± 0.66	2.69 ± 0.29	8/10	7.1	4-11
	2.	154.00 ± 6.21	9.83 ± 0.54	3.17 ± 0.20	11/12	6.4	3-11
	3.	154.60 ± 4.43	13.31 ± 0.35	4.34 ± 0.14	20/20	5.3	3-9
<i>R. meltada</i>	1.	55.13 ± 5.11	6.97 ± 0.52	6.11 ± 0.42	18/22	6.5	4-9
	2.	52.25 ± 2.62	10.60 ± 0.99	10.39 ± 0.56	12/12	5.3	3-8
<i>R. rattus</i>	1.	112.40 ± 9.05	4.96 ± 0.40	2.16 ± 0.34	9/10	7.1	4-10
	2.	133.20 ± 7.43	9.23 ± 0.46	3.50 ± 0.18	12/12	6.9	4-10

TABLE — 3

TOXICITY OF VARIOUS ANTICOAGULANT RODENTICIDES AGAINST SOME INDIAN DESERT DWELLING RODENTS

Species					
Anticoagulant	Conc. of poison (%)	Feeding period (days)	Mortality (%)	Av. poison ingested (mg/kg)	Sources
M. hurrianae					
Chlorophacinone	0.0075	7	100	44.60	Prakash & Mathur 1979
Warfarin	0.025	7	66.6	114.10	Mathur & Prakash 1981b
Fumarin	0.025	7	75	53.00	Mathur & Prakash 1981b
Bromadiolone	0.0025	3	100	5.70	APR, 1983 CAZRI
Brodifacoum (Powder)	0.005	3	100	5.68	Mathur & Prakash 1981a
Brodifacoum (Liquid)	0.005	2	100	5.23	Present study
T. indica					
Chlorophacinone	0.0075	7	100	34.80	Prakash & Mathur 1979
Warfarin	0.025	7	50	104.16	Mathur & Prakash 1981b
Fumarin	0.025	7	66.6	45.73	Mathur & Prakash 1981b
Bromadiolone	0.005	1	100	2.0	Jain 1980
Brodifacoum (Powder)	0.005	3	100	12.06	Mathur & Prakash 1981a
Brodifacoum (Liquid)	0.005	3	100	4.34	Present study
R. meltda					
Chlorophacinone	0.0075	7	50	19.7	Prakash & Mathur 1979
Fumarin	0.025	7	0	32.05	Mathur & Prakash 1981b
Bromadiolone	0.005	2	0	3.00	APR CAZRI 1983
Brodifacoum (Powder)	0.005	2	100 M 100 F	6.28 14.16	Soni & Prakash 1984
Brodifacoum (Liquid)	0.005	2	100	10.39	Present study
R. rattus					
Chlorophacinone	0.0075	7	91.6	13.45	Prakash & Mathur 1979
Coumatetralyl	0.0375	7	100	71.98	Mathur & Prakash 1984
Warfarin	0.025	7	91.6	89.92	Mathur & Prakash 1981b
Fumarin	0.025	7	100	128.33	Mathur & Prakash, 1981b
Difenacoum	0.005	2	100 M 100 F	7.0	Hadler et al., 1975
Bromadiolone	0.005	1	100 F	8.0	Hadler et al., 1975
Brodifacoum (Powder)	0.005	4	100	2.98	Jain 1980
	0.005	4	100	4.39	Mathur & Prakash 1981a
Brodifacoum (Liquid)	0.005	2	100	11.49	Mathur & Prakash 1981b
			100	3.50	Present study

M = Male, F = Female.

Susceptibility : After consuming the liquid bait for 24 hours, 83.3, 80.0, 81.8 and 90.0 per cent to *M. hurrianae*, *T. indica*, *R. meltada* and *R. rattus* died respectively in a single day exposure. As a cumulative effect of 2-days exposure, 100 per cent *M. hurrianae*, *T. meltada* and *R. rattus* were succumbed by the poison. However, 100 per cent, *T. indica* died only after 3 days of poison baiting with liquid brodifacoum (Table 1). Maximum deaths occurred after 5-6 days of liquid brodifacoum consumption. Earliest death, however, occurred on 3rd day, whereas the last rodent died after 11 days of exposure to the anticoagulant (Table 1).

A comparison of the performance of liquid and powder Brodifacoum indicates that the former is more efficient, being faster in action. Liquid poison baiting resulted into 100 per cent kill of *M. hurrianae* and *R. rattus* after two days whereas the same level of control success was achieved in 3-4 days when powder formulation of brodifacoum was used (Mathur and Prakash, 1981a, Table 3).

When the results of liquid formulation of brodifacoum are compared with its wax block (unpublished data), performance of the latter is found to be more efficient against *M. hurrianae* and *T. indica* as wax blocks yielded complete kill in a single day exposure. However, no significant change in mortality figures was observed in case of *R. meltada* (Table 2).

A comparison of efficacy of liquid brodifacoum with that of chlorophacinone and bromadiolone (Chaturvedi et al., 1979), Warfarin and Fumarin (Mathur and Prakash, 1981b), coumatetralyl (Chopra, et al., 1983; Mathur and Prakash, 1984) reveals that it is more effective and needs to be given to target species for a short period (Table 3).

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