COMPARATIVE EFFICACY OF SOME ANTICOAGULANT RODENTICIDES AGAINST INDIAN DESERT GERBIL, *MERIONES HURRIANAE* (JERDON)

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ABSTRACT

Investigation on the new generation anticoagulant rodenticides was carried out on the Indian desert gerbil. Brodifacoum and bromadiolone were found to be highly effective against this species and gave desirable mortality within a reasonable period at a very low concentration. The post poison bait consumption showed insignificant deviation from normal bait showing that anticoagulant rodenticides do not produce bait shyness. To avoid over-killing of the rodent pest, the techninque of pulse baiting is recommended.

It is well established that in the tropical and sub-tropical countries the multiplication of rodents is much faster than in other biomes and the problem tend to be complex, sporadic, highly variable and quite complicated in nature. Man has also inadvertently or carelessly, been providing adequate shelter and nourishment to these mini creature in residential premises, godowns and in crop fields and thereby helping them in their survival and multiplication.[1] Their superiority in adapting themselves to almost all habitats and changing environmental conditions, have made them man's most dreaded enemy. Control of rodents is, therefore, of atmost importance. Rodenticides play a significant role in combating rodent pests. Conventional rodenticides have their own inherent defects, which put a question mark on their use in a developing country like India. In the present study an attempt has been made to study the comparative efficacy of new generation anticoagulant rodenticides against Indian desert gerbil, *Meriones hurrianae*, a serious rodent pest of crop in fields.

MATERIAL AND METHODS

The gerbils, *Meriones hurrianae* were collected from fields around Jaipur (26°.4' N; 75.° 48' E) and acclimatised them to the laboratory conditions. Sick, injured and pregnant animals were discarded. In `No-choice feeding trials' poisoned bait was exposed to the individually caged gerbils. The dose concentration and range of feeding period for various rodenticides were: bromadiolone (0.005 and 0.0025 percent, 1 and 3 days); brodifacoum (0.005 and 0.0025 percent for 1, 2 days), warfarin (0.025 and 0.012 percent; 3,, 7, 14 and 3, 14 days).

The rodenticides were mixed in wheat flour and consumption was recorded daily, nearest to 0.1 g.

Plain and poison bait feeding:-Plain feed prepared from wheat flour and 2% sugar, was given to acclimatised gerbils from first to third day. Poison bait of bromadiolone and brodifacoum as provided on 4th day and that of warfarin from 4th to 10th day. Plain feed was supplied to the poisoned gerbils till death.

RESULTS AND DISCUSSION

Based on combined sex mortality data, the toxicity is summarised in Table-1. The analysis revealed that all the three rodenticides killed the target species in a desirable period, which mean that all are effective against this species. The efficacy of brodifacoum was highest, though it was not significantly different from that of bromadiolone.Brodifacoum has the lowest mean mortality period and poison intake. Similar findings have been reported [2-4] in other rodents species.

Bromadiolone followed brodifacoum in efficacy, during no choice test as it has a little longer mortality period with a comparative higher poison intake. Warfarin required longer feeding periods, to get 100 percent mortality, which indicates its lower toxicity against *M. hurrianae*. The mean mortality period of gerbil was comparatively higher than that of house rat, *Rattus rattus* [5] and confirms the earlier report that gerbils are less susceptible to this anticoagulant rodenticide.

*Consumption of plain and poison bait:*_

The quantity of plain bait consumed on first three days show a similar trend (Table; 2). On fourth day, the consumption of poison bait show insignificant deviation from plain food intake after poisoning the gerbils with bromadiolone, was significant ($P<0.01$) on 7th day and was highly significant ($P<0.001$) from 8th day onwards. In case of brodifacoum poisoned gerbils the decrease in plain food intake was found to be significant from 7th day onwards.

The poison bait of warfarin was provided from 4th to 10th day. Mean daily intake of poison bait was smooth for first three days viz. from 4th to 6th day. The intake of poison bait on 7th day was found to be significantly less ($P<0.05$). From 12th day onwards, the depletion of plain food intake was found to be highly significant (<0.001).

Single dose anticoagulant rodenticides kill the target species within a reasonable period at a very low concentration, which mean that they are highly toxic against the gerbils. Intake of bait after feeding poison to the gerbils was found to be more or less same and did not show any significant deviation from that of first three days, which means that

TABLE: 1

Toxicity of some anticoagulant rodenticides against Indian Desert gerbil, *Meriones hurrianae* (Jerdon)

Poison and concentration	Feeding period (days)	Mean body weight (g)	Mean bait intake (g/100gb. wt)	poison eaten (mg/kg)	Mortality	Day to death	
						Mean	Range
Bromadiolone	1	85.50	10.43	5.22	9/10	7.4	4-12
0.005%	2	73.30	18.70	9.35	10/10	7.1	3-11
	3	65.45	23.35	11.67	10/10	7.3	4-12
0.0025%	1	66.60	11.22	2.81	7/10	7.8	5-16
	2	74.20	20.06	5.02	9/10	6.8	3-12
Brodifacoum	1	61.43	7.86	3.92	10/10	6.9	3-11
0.005%	2	70.38	17.66	8.83	10/10	6.71	3-11
0.0025%	1	95.65	10.45	2.61	9/10	8.2	4-12
	2	61.30	17.06	4.26	10/10	6.87	4-12
Warfarin	3	67.50	23.60	59.00	9/10	12.4	6-18
0.025%	7	66.40	65.85	164.62	10/10	10.6	5-14
	14	83.42	88.24	220.60	10/10	8.4	4-16
0.012%	3	80.60	26.15	31.38	6/10	11.6	5-16
	14	78.33	101.30	121.56	10/10	9.8	5.15

TABLE: 2

Intake of plain and poison bait by Indian desert gerbil, *Meriones hurrianae* (Jerdon) in g/100g body weight

Rodenticide	Bromadiolone (0.005%)	Brodifacoum (0.005%)	Warfarin (0.025%)
Number and sex	8(4M+4F)	8(3M+5F)	8(4M+4F)
Body weight (g)	70.33	68.65	72.30
1st day	11.22	10.81	9.04
2nd day	10.30	10.62	9.32
3rd day	8.22	10.68	8.87
4th day	9.05*	10.04*	8.90*
5th day	8.78	9.61	8.72*
6th day	6.20	7.30	7.50*
7th day	7.00	4.08	6.34*
8th to 10th day	5.35	3.48	8.63*
11th day	2.36	1.15	4.37
12th day	0.85	-	3.80
13th day	-	-	1.08
14th day	-	-	0.25
Percent mortality	100%	100%	100%
Mean period to death (days)	7.86	6.76	9.34

* Poison feeding

all the rodenticides, which were trialed do not induce any bait shyness and poison aversion indesert gerbils. However it is reported[6] that in practice, 49 percent control could be achieved by single dose baiting of bromadiolone (0.005%). This may be attributed to the fact that the whole population failed to reach the bait materials, when it was exposed for a single day. Thus in practice complete killing can be obtained by continuous surplus baiting. To avoid over killing of the rodent population by continuous surplus baiting, it would be advisable to use an alternative technique of 'pulse baiting'. This technique requires less bait material and labour cost than saturation baiting but is equally effective.[7&8]

The greater activity and efficacy of bromadiolone and brodifacoum will make it

possible to economise on rodenticide materials and man power by decreasing the amount of bait laid and by decreasing the frequency with which these need to be replenished.

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