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EFFICACY TESTS OF DIFFERENT RODENTICIDES ON SOME SPECIES OF RATS IN THAILAND

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ABSTRACT: Two acute rodenticides, zinc phosphide and Vacor, at different concentrations were tested on the rice field rats (Rattus argentiventer) and the bandicoot rats (Bandicota indica) with a choice-feeding procedure. It was found that zinc phosphide at 0.5%, 0.8%, 1.6% caused 30%, 30%, and 60% mortality, respectively, to R. argentiventer, and at 1.6% caused death only 30% to B. indica, whereas Vacor at 0.5%, 0.8%, 1.6% caused 70%, 60% and 80% mortality, respectively to R. argentiventer and this compound at 1.6% killed 60% of B. indica. Five anticoagulants Actosin-P, warfarin, Racumin, brodifacoum, and chlorophacinone also were tested on R. argentiventer and only brodifacoum was tested on B. indica at an appropriate concentration with a non-choice feeding procedure. It was found that with one day consumption of the poisoned bait brodifacoum 0.005% is the only anticoagulant that caused 100% mortality to R. argentiventer and B. indica, whereas, Actosin-P, warfarin, Racumin, and chlorophacinone killed 20%, 20%, 30%, and none of R. argentiventer, respectively.

INTRODUCTION

Thailand is an agricultural country. The major crops are rice, corn, sugar cane, casava, coconut, soybean, ground nut, tropical fruits, and vegetable, etc. Several species of small rodents such as, Bandicota indica, Bandicota savilei, Rattus losea, Rattus argentiventer, Mus caroli and Mus cervicolor are the major pests of agricultural crops. The rodents cause damage to rice at every stage during the growing season. They also attack corn and sugar cane before the harvesting time. Soybean and ground nut also are taken by these rodents. Rattus rattus is a species of rodents which is mostly found attacking coconut in some areas of the country.

Zinc phosphide, Racumin, and warfarin are the chemicals used for rat control in Thailand. With the cooperation of Thai-German Rodent Control Project, the use of zinc phosphide mixed with broken rice was recommended at the rate of 0.5% for rat control. Racumin and warfarin mixed with broken rice at the rate of 0.0375% and 0.025%, respectively, were recommended for using against the rats in the country. In an efficacy test of two rodenticides in laboratory with a no-choice feeding procedure, Tongtavee and Yenbutra 1972, reported that zinc phosphide at the rate of as low as 0.25% caused 100% mortality to R. argentiventer, and at the rate of 1% caused death only 66.7% to B. indica. In the case of testing warfarin 0.025% against these rats, they found that only 40% of R. argentiventer which consumed warfarin continuously for 2 days, died within 7 to 9 days, whereas, this compound caused 90% mortality to B. indica within 6 to 11 days.

The present paper describes and reports the results of laboratory testing of different rodenticides on R. argentiventer and B. indica conducted at the laboratory of Zoology Branch, Department of Agriculture, Bangkok, Thailand, during January 1979 to January 1980. Only zinc phosphide, warfarin, and Racumin are available in the markets in Thailand.

METHODS AND MATERIAL

The rice field rat Rattus argentiventer and the bandicoot rat Bandicota indica were trapped in the central plains of the country and brought to the laboratory of Zoology Branch, Department of Agriculture, Bangkok. The adult rats of the same size were selected for the study, and they were kept in the laboratory for at least one week prior to the test. Each of R. argentiventer was kept in an individual laboratory cage measuring 8 x 9 x 14 inches attached with nest box measuring 6 x 6 x 4 inches, and each of B. indica was kept in an individual laboratory cage measuring 8 x 12 x 18 inches. The rats were fed daily with laboratory food (pig food manufactured by International Industrial Commercial Co. Ltd.), and they were acclimatized to laboratory conditions for about one week prior to the test. Water is available at all times. Only the animals that consumed laboratory food normally during the pretest were used for the study. Broken rice was used as bait material and as a choice food in a choice feeding procedure. Equal numbers of males and females were used in most cases. A choice feeding procedure was conducted for testing the efficacy of acute rodenticides, Vacor and zinc phosphide, on R. argentiventer and B. indica for 3 day consumption. The position of the unpoisoned food and poisoned food was alternated daily. For comparison of the efficacy of different anticoagulants, the animals were offered the poisoned bait for one day in all cases with a non-choice feeding procedure.

RESULTS AND DISCUSSION

Choice Feeding Tests With Zinc Phosphide and Vacor

The results of testing zinc phosphide and Vacor at different concentration on R. argentiventer and B. indica are summarized in Table 1. Zinc phosphide at the highest concentration of 1.6% killed 60% of R. argentiventer and 50% of B. indica, whereas, Vacor at 1.6% killed 80% of R. argentiventer and 60% of B. indica. It is expected that zinc phosphide and Vacor at higher concentration may give higher mortality to the rats. However, without the use of vegetable oil as adhesive substance, it is not possible to increase the concentration of the poisoned bait using broken rice as bait material.

Table 1. Results of choice feeding tests with zinc phosphide or Vacor mixed with broken rice on Rattus argentiventer and Bandicota indica for 3 day feedings.

Poisons and concentrations	Rodent species	Mean body wt.(g)	Lethal dose mg/kg Mean & Range	Sublethal dose mg/kg Mean & Range	Mortality	Days to death Mean	Range
Zn_3P_2 0.5%	R.argen*	104	? (? - 68.2)	15.5 (1.0- 56.3)	3/10	3.7	1-8
Zn_3P_2 0.8%	R.argen*	117	77.5 (69.3- 72.0)	21.7 (10.9- 44.8)	3/10	1.7	1-2
Zn_3P_2 1.6%	R.argen*	150	78.8 (34.3-180.1)	9.9 (0 - 30.2)	6/10	1.3	1-2
Zn_3P_2 1.6%	B.indica	650	38.9 (11.6- 74.5)	12.9 (2.4- 32.3)	5/10	2.7	1-15
Vacor 0.5%	R.argen*	123	47.7 (23.6-105.5)	16.9 (2.7- 39.5)	7/10	4.1	1-11
Vacor 0.8%	R.argen*	171	83.6 (51.0-117.2)	65.9 (23.3-115.7)	6/10	4.3	1-8
Vacor 1.6%	R.argen*	186	50.3 (25.5- 69.6)	51.9 (27.6- 76.2)	8/10	3.9	1-8
Vacor 1.6%	B.indica	578	84.7 (49.7-168.6)	128.3 (51.9-271.8)	6/10	2.8	1-5

*Rattus argentiventer

The reason of testing these poisoned baits without the use of vegetable oil is to facilitate the application of these rodenticides for thai farmers since they lack of interest to use vegetable oil as adhesive substance. The results of this experiment are reported only for scientific research not for the recommendation.

No-Choice Feeding Tests With Different Anticoagulants

Five anticoagulants Actosin-P 0.0375%, warfarin 0.025%, brodifacoum 0.005%, Racumin 0.0375%, and Chlorophacinone 0.005% were tested on R. argentiventer. Only brodifacoum 0.005% was tested on B. indica. The results are summarized in Table 2. With one day feeding of these anticoagulants, R. argentiventer and B. indica were completely killed by brodifacoum 0.005% within 6-11 days and 4-9

Table 2, Results of no-choice feeding tests with anticoagulants mixed with broken rice on Rattus argentiventer and Bandicota indica for one day feeding.

Poisons and concentrations	Rodent species	Mean body wt.(g)	Lethal dose mg/kg Mean & Range	Sublethal dose mg/kg Mean & Range	Mortality	Days to death Mean	Range
Actosin-P 0.0375%	R.argen**	115	13.5 (12.8-14.2)	15.8 (8.4-28.4)	2/10	7.5	5-10
Warfarin 0.025%	R.argen**	140	12.0 (6.4-17.6)	6.7 (1.8-10.3)	2/10	8.5	7-10
Racumin 0.0375%	R.argen**	181	23.6 (16.3-28.8)	8.6 (5.2-14.3)	3/10	7.3	6-8
Chloropha-* cinone 0.005%	R.argen**	180	-	2.0 (1.3- 2.7)	0/10	-	-
Brodifacoum* 0.005%	R.argen**	145	1.6 (0.4- 2.6)	-	10/10	8.3	6-11
Brodifacoum* 0.005%	B.indica	591	1.4 (0.3- 2.4)	-	10/10	6.1	4-9

* Oily toxicant
** R. argentiventer

days, respectively. The results of this experiment are reported only for scientific research not for recommendation. Further study of warfarin, Racumin, and Chlorophacinone has been carrying out at the laboratory of Zoology Branch, Department of Agriculture, Thailand.

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