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EVALUATION OF CALCIUM CYANIDE FOR THE CONTROL OF PADI FIELD RATS

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RINGKASAN

Calcium cyanide didapati sangat berkesan sebagai pembinasa wap lobang tikus dan jumlah lobang tikus aktif kurang 78.6%. Sekurang-kurangnya dua kali disembur berturut-turut di kawasan tertentu disyorkan jika kawalan pencegahan.

INTRODUCTION

In Malaysia calcium cyanide has been used for a long time as a burrow fumigant for padi field rat control. SOUTH (1931) reported the use of calcium cyanide as a gasing powder. With the increase in padi growing areas it is now increasingly used to control rat damage to growing rice. Fumigation of the rat burrows was carried out at times of severe rodent damage or outbreak. Due to its high toxicity, its application has been restricted to trained personnel of the Department of Agriculture. The present study was conducted to determine the efficiency of calcium cyanide as a burrow fumigant and to improve the technique of application.

MATERIALS AND METHODS

This study was carried out at MARDI Research Centre, Bumbong Lima. The field area was divided into 14 plots of one hectare each. The bunds dividing the field were 3 ft. wide and the top of the bunds were more than 1 ft. above water level at all times. These bunds were observed to be the burrowing sites for *Rattus argentiventer.*

The plots were chosen at random for treatment and each plot was fumigated at monthly intervals for 3 consecutive days over a study period of 12 months. Calcium cyanide at 42% a.i. was applied into the burrow systems with the aid of a foot pump. For each hole the plunger of the pump was depressed three times.

The number of active rat burrows was first determined before each treatment by plugging and marking all holes found in the area on the first day. The holes were marked with bamboo stakes. Holes that were opened on the next day were termed active and recorded. These active burrows were then fumigated with calcium cyanide and the holes replugged after treatment.

The following morning, all holes that were found open were recorded and any new burrows were similarly marked and recorded. These holes were then refumigated and replugged. On the day after the 3rd and final round of fumigation, burrows that remained open were excavated and the findings recorded. All animals that escaped from the holes during treatment were caught by nets and identified.

RESULTS

The monthly record of burrows and the number and percentage of active burrows found before treatment were as shown in *Fig. 1.* A mean of 58.7% of the total number of burrows

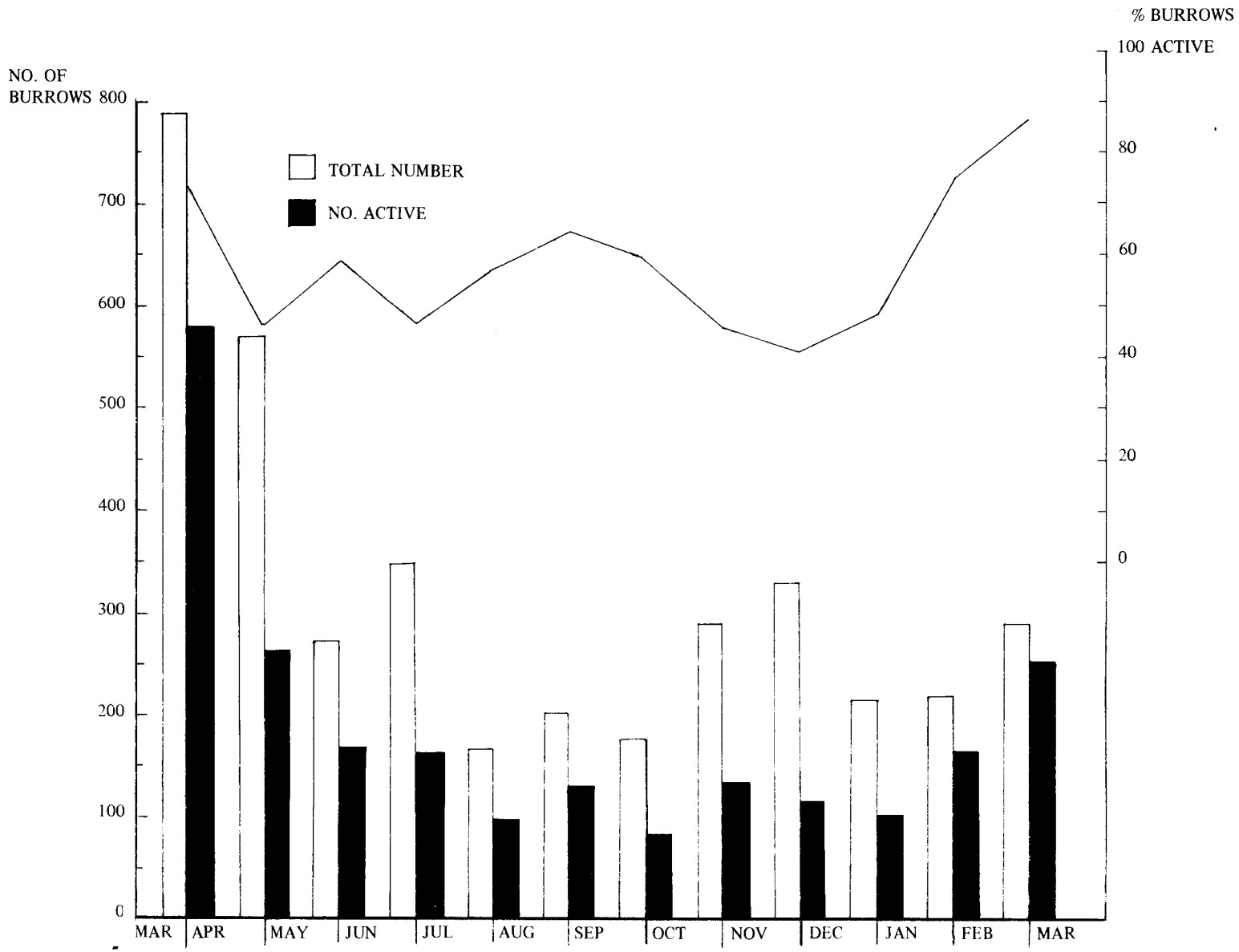

Figure 1. Monthly records of rats burrows found in the field

marked were found to be active. Behaviour of marked burrows that were classed active was as follows: on the first day after marking 66.1% were found open; 83.6% on the second day; and 92.5% on the third day.

The reductional effect of calcium cyanide on the active burrows was as shown in *Fig. 2.* Calcium cyanide was found to reduce the number of active burrows by 63.5% in the first application, 73.0% after two applications and 78.6% after three applications.

A total of 416 active burrows were examined by excavation and 23.0% were found to contain rats. Of the total above examined, 86 remained active even after the three consecutive treatments and 46.5% of these were found to contain rats.

The monthly record of the number of animals captured was as shown in *Fig. 3.* A total of 318 animals were caught and all were identified to be *R. argentiventer.* Sixty-seven percent of the total animals were captured in the first month.

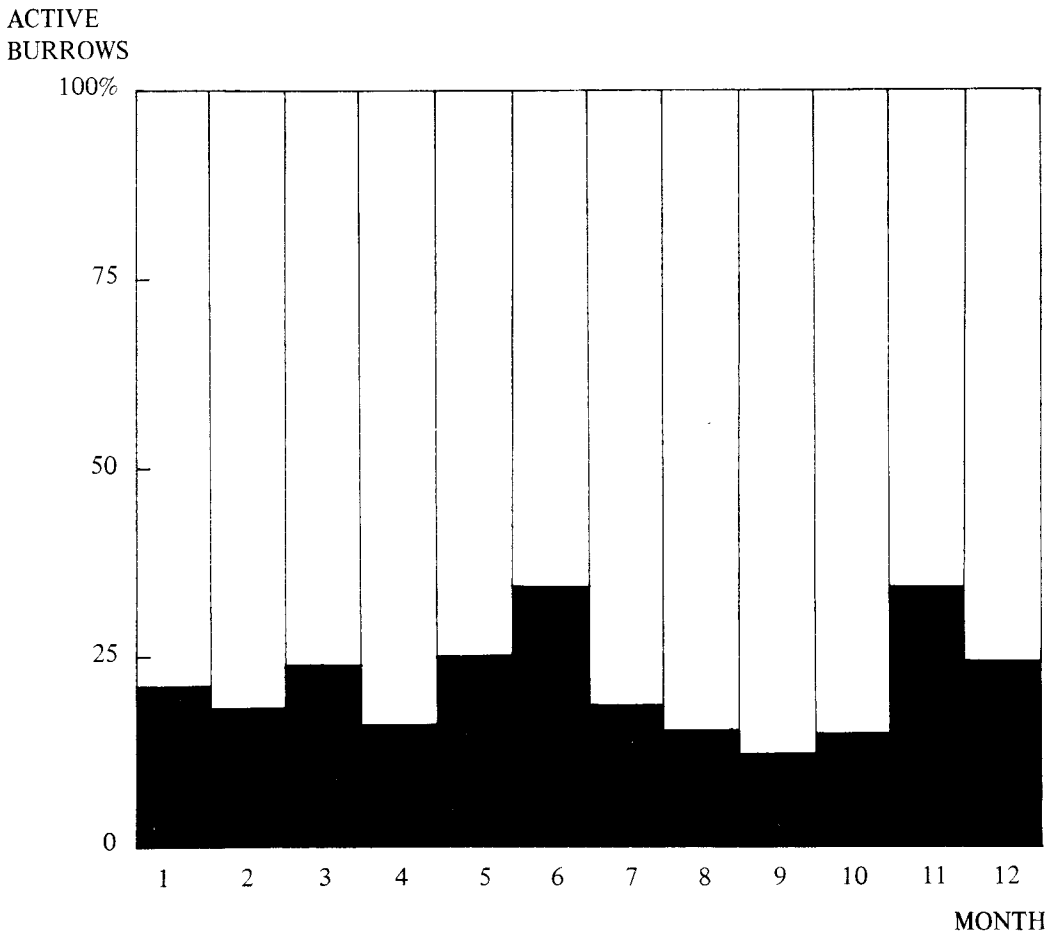

Figure 2. Percent of active burrows remaining after 3 applications of calcium cyanide.

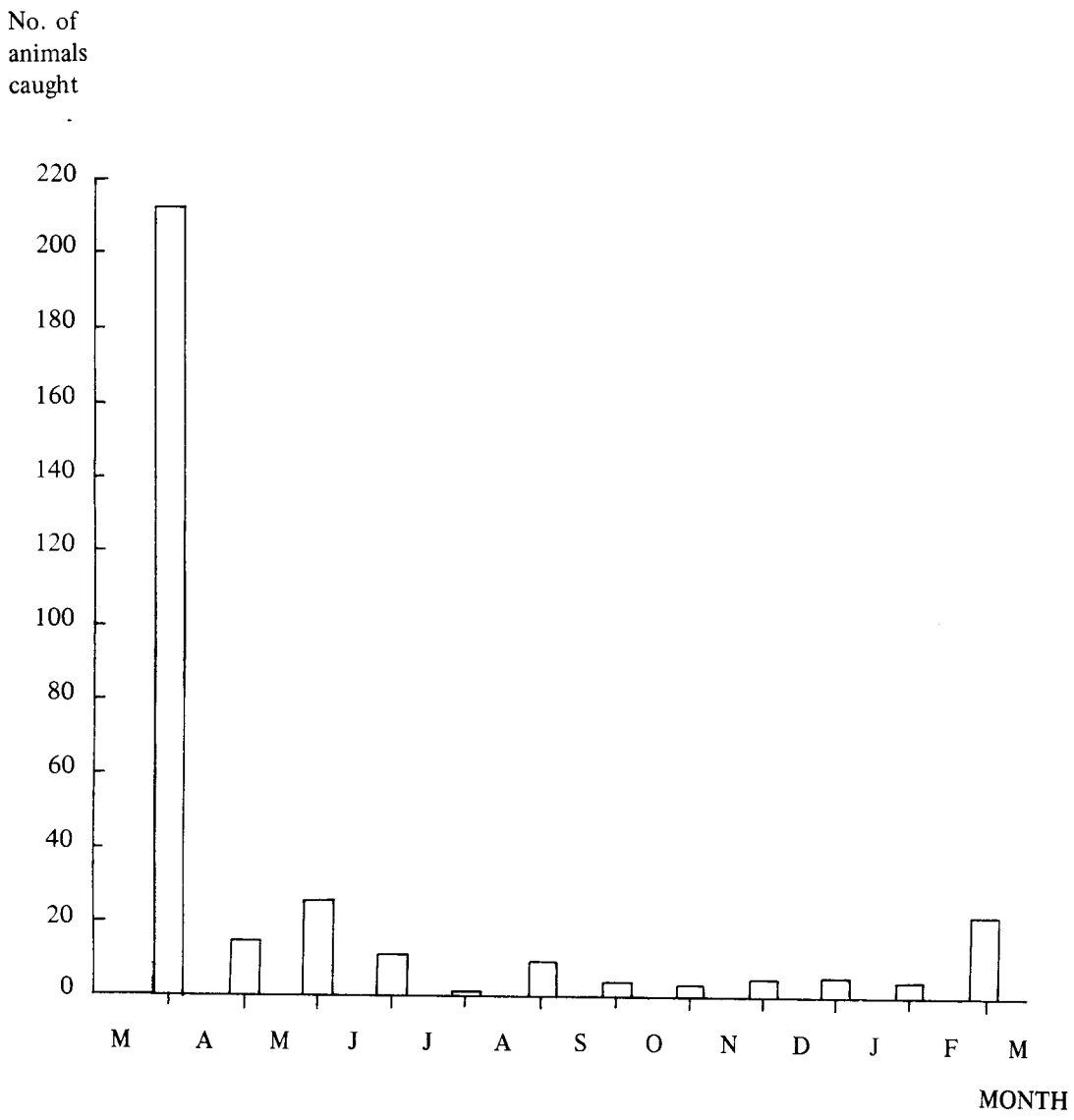

Figure 3. Monthly records of number of rats caught during study period

DISCUSSION

It was found that in the field a mean of 58.7% of the burrows found were active. This low figure could be explained probably by the observation that the rats made more than one burrow entrances and also there were some old and abandoned burrow systems. The number of active burrows found was probably influenced by the breeding season. The percentage of active burrows was observed to increase in the periods of February and March; August and September, which coincided with the time when litters were found in the nests *(Fig. 1)*. In field practice the determination of the number of active burrows would help to save material and labour and hence the cost of the control measure if adopted.

The number of active rat burrows was used as an index to monitor the rat population before each round of treatment *(Fig. 1)*. It was observed that the number of active burrows

marked were found to be active. Behaviour of marked burrows that were classed active was as follows: on the first day after marking 66.1% were found open; 83.6% on the second day; and 92.5% on the third day.

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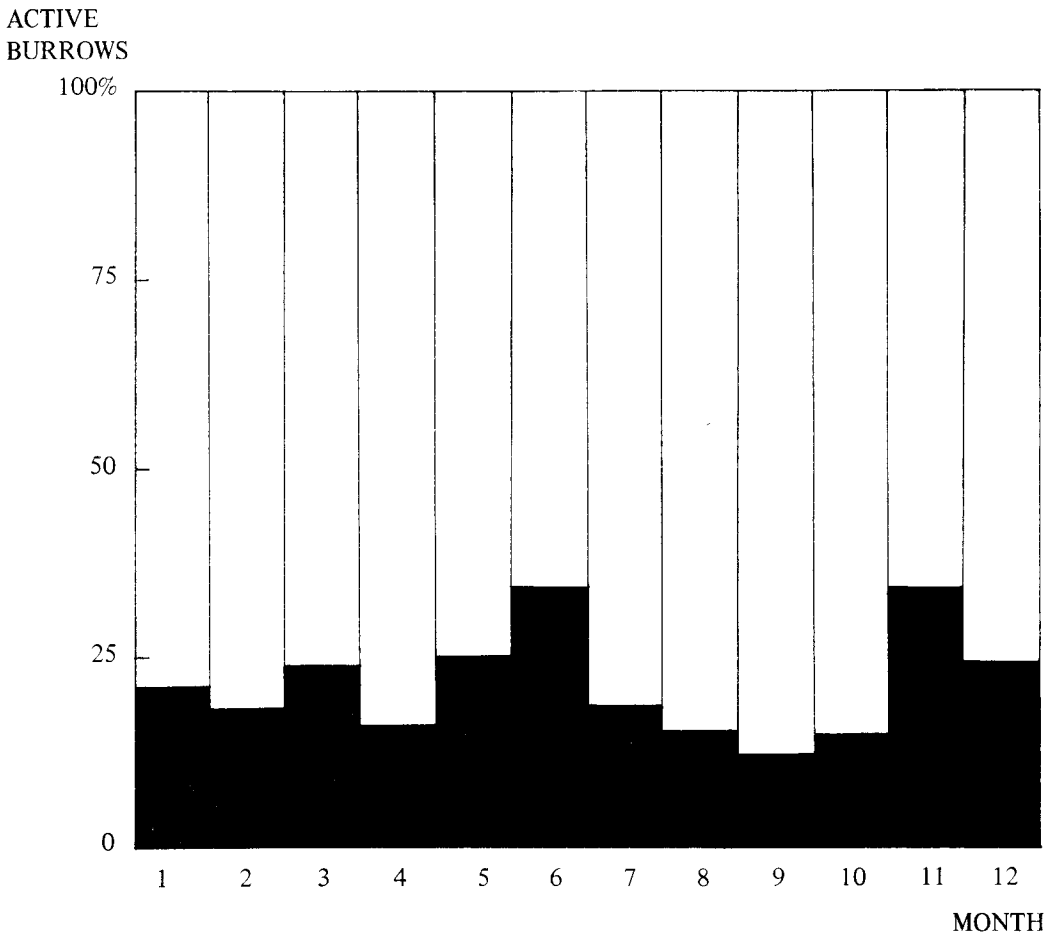

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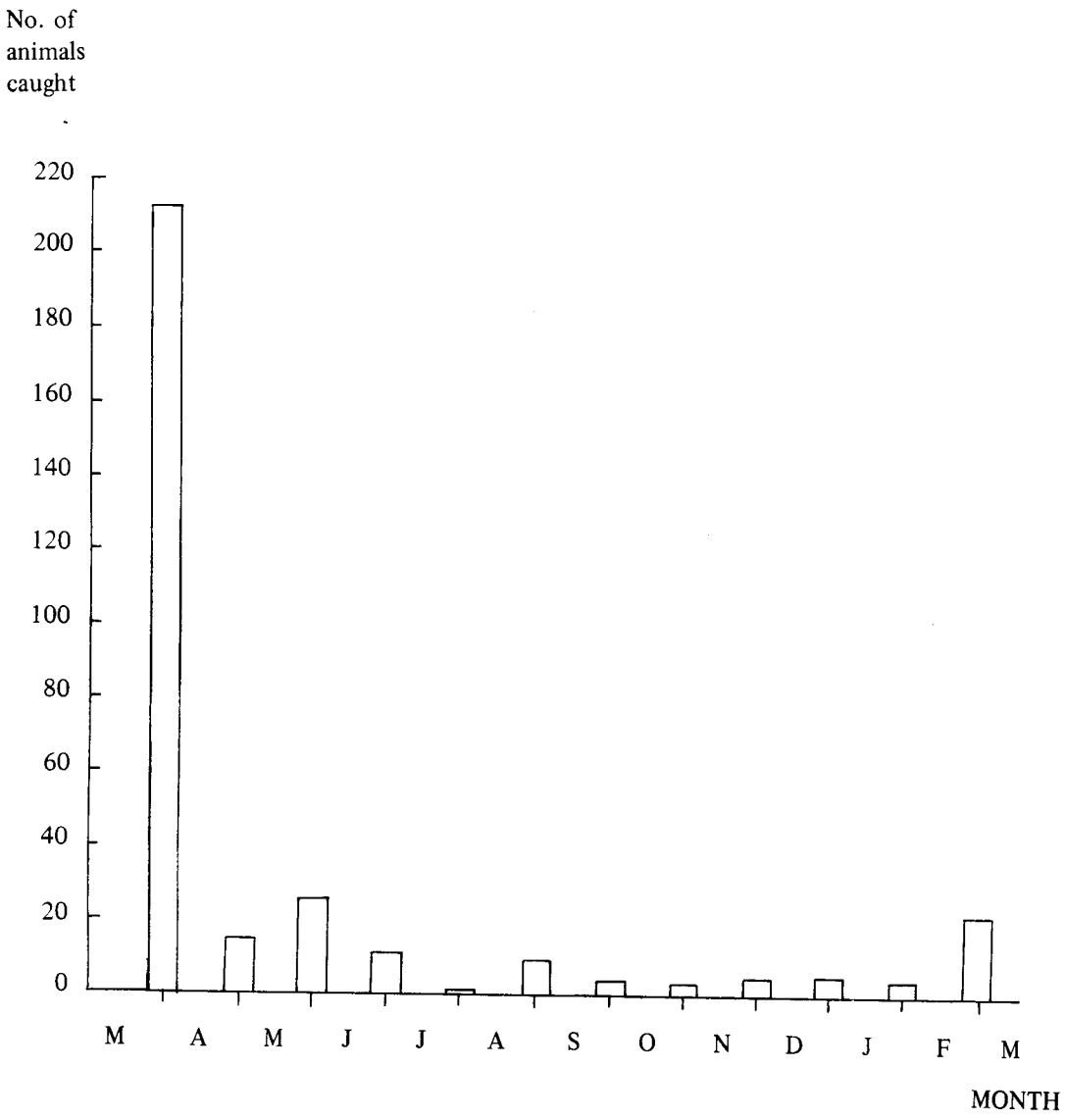

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The number of active rat burrows was used as an index to monitor the rat population before each round of treatment *(Fig. 1)*. It was observed that the number of active burrows

initially was very high but the number dropped sharply after the implementation of fumigation practices. Subsequently, the number of active burrows was maintained at an average of 152 (mean of 11 months) for the whole study area. This number probably indicated the immigration of animals into the depopulated area as the remaining active burrows were excavated after 3 applications of calcium cyanide each month.

Results obtained indicate that calcium cyanide could reduce the number of active burrows by 78.6%. The sharp decline indicates that the number of animals living in the field was greatly reduced by the applications of calcium cyanide *(Fig. 2)*. This was confirmed by the reduction in the number of animals caught. Two hundred and thirteen animals were caught in the first month as compared to a mean of 9.5 animals for the following 11 months *(Fig. 3)*. This constituted an average reduction of 96% in the number of animals caught.

The 78.6% reduction in the number of active burrows probably reflected the threshold of the effectiveness of calcium cyanide as a burrow fumigant. Under the above experimental conditions, this threshold was probably affected by several factors, an important one being the extensive burrows systems of *R. argentiventer*. It was observed that the burrow systems were often complicated and constructed with several entrances as found in the excavation of 416 burrows. The extensive tunnels probably caused the rapid dissipation and breakdown of hydrogen cyanide in the soil profile, thus partially accounting for some of the burrows remaining active after the treatments were completed.

Another important factor is the condition of the soil at the time of application. The porosity and dampness of the soil probably affected the level of hydrogen cyanide since calcium cyanide requires moisture to trigger off its release.

In the adoption of calcium cyanide for the control of padi-field rats the following are suggested in ensuring effective control:-

(i) Determine the number of active burrows

(ii) Seal the holes properly after application of the fumigant

(iii) At least two successive applications be made over the same area. With 3 applications 90% of the active burrows would have been treated.

(iv) For precaution against accidents during the process of fumigation always face in the same direction as the wind.

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SUMMARY

Cyanide calcium was found to be effective as a burrow fumigant and a 78.6% reduction in the number of active rat burrows was recorded. At least two successive applications over a given area is recommended if this control measure is adopted.

REFERENCES

SOUTH, F.W. (1931). Rat destruction in Malaya, *Mal. Agric. J. 19* : 112–122.