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NOTES ON RODENT PEST AFFECTING COCONUT[1]

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In a 2-hectare coconut grove in Bay, Laguna, 3,199 fallen rat-damaged nuts valued at about P479.85 were collected for a period of one year. Of these damaged nuts, 65% had injury at the base, 25% sustained lateral injury, and 10% suffered distal injury. Size-wise, 46% of the damaged nuts are large, 30% medium and 24% small

Only one species of rats, *Rattus rattus mindanensis* Mearns was found in the study area.

Trunk-banding proved to be an efficient and profitable method of controlling rat damage to coconut fruits. Rats damaged 405 nuts in 10 control trees while no nuts were lost in the trunk-banded trees.

INTRODUCTION

The importance of coconut to Philippine agriculture is indicated by its hectarage, contribution to farm income and the number of farmers engaged in coconut planting. More than 1,600,000 hectares planted with coconut contribute over 12% of the total farm income of the Philippines Nyberg, 1968).[3] About 440,000 farmers grow coconut commercially and as of 1965 the value of coconut exports was P948,000,000 (Anon., 1965). These facts indicate the importance of the coconut industry to the economy of the nation.

Among the most serious pests which plague the coconut industry are rats. Unfortunately, there are still and no extensive studies on rats that attack coconut and other crops such as rice, corn, sugar cane, root crops, pineapple and vegetables (Alfonso et al., 1967). Strecker (1962) found in Marshall and Majuro Islands that nuts damaged by rats ranged from those the size of orange up to the size of the drinking nut stage. Smith (1967) found that the Polynesian rats do not climb the trees. However, Wodzicki (1968) found that Polynesian rats climb the coconut palm

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[3] A Nyberg. 1968. The Philippine Coconut Industry. U.P. Ph.D. dissertation (unpublished).

and are responsible for the damage of coconuts in the Tokelaus. Wodzicki (1968) also confirmed the observations obtained in 1967 and 1968 that all rats do their damage to coconuts while they are in the tree and not when on the ground. Other observations by Wodzicki (1968) showed that *Rattus exulans* build nests at the palm crown.

This study has three primary objectives: first, to determine the value and extent of rat damage to coconut in a typical coconut grove in Laguna, a major coconut-producing province; second, to obtain the monthly population density indices on rats in the coconut grove; and third, to determine the effectiveness of trunk-banding in the control of rat damage to coconut.

MATERIALS AND METHODS

The study area was a typical 2-ha coconut grove in Bay, Laguna. The site was 2.7 kilometers from the national highway and bounded by ricefields and coconut grove. There was an existing irrigation canal that separated the coconut grove from the adjacent ricefield. The coconut grove was divided into two study plots. One plot was used as trapping area where monthly trapping of rodents was conducted. The other plot was utilized for studying damage to nuts by rats, and to determine the effectiveness of trunk-banding as a method of controlling rat damage to coconut.

Monthly population density indices of rats

The standard trapping technique was used in obtaining the index of population density of rats in the coconut grove. A trapline consisting of fifty snap traps was set between coconut rows for three successive nights each month for twelve months. The traps were set 25 feet apart. Pieces of slightly toasted coconut meat served as bait. The trapline was baited in the evening and serviced the following morning.

Rat-proofing as a method of controlling rat damage to coconut.

Twenty fruit-bearing coconut trees selected at random were observed for eight months. The number of healthy and rat-damaged nuts in each tree was recorded. The newly damaged nuts at the palm crown injured within the week were numbered and recorded. After the period of observation, the trees were grouped into ten pairs. Pairing was based on similarity of extent of damage, height of tree, and abundance of fruiting. One tree from each of the ten pairs was randomly picked to form the group of control trees. The other trees were banded for rat proofing. A piece of plain

G.I. sheet 18 in. wide was nailed around the trunk 10 feet from the ground (Fig. 1). All overlapping leaves between trees were cut to prevent rats from transferring from one tree to another. The banded and unbanded trees were observed weekly by climbing the trees and recording incidence of rat damage and fruiting. The observation lasted for 17 weeks.

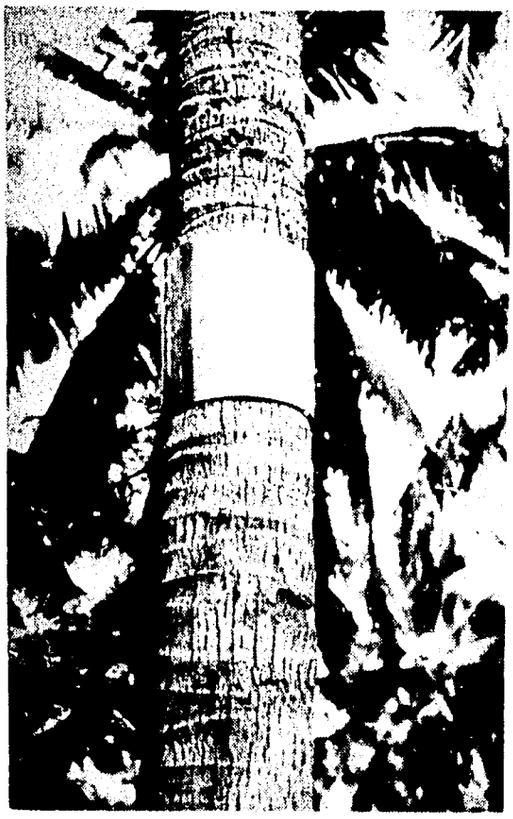

Figure 1. The 18-inch metal band is smoothly nailed around the trunk 10 feet from the ground.

RESULTS AND DISCUSSION

Estimating the value of rat damage to coconut and related observations

The damaged fallen nuts were classified according to diameter sizes; small, 6-10 cm; medium, 11-16 cm; large, greater than 16 cm. The nuts were further classified according to damage: basal, when injury was at the peduncle; lateral, at the side, and distal, at the terminal part (Figs. 2a and 2b). An injury was considered deep when it penetrated the hard shell; otherwise, it was considered superficial.

The number of damaged nuts varied according to the size of nuts, and location and extent of damage. Larger nuts tended to have more and deeper damage as compared to small and medium-sized nuts (Tables 1a & 1b). Of the 3,199 damaged nuts collected during the 50-week period, 65% (1,465) were damaged at the base, 25% (788 nuts) sustained lateral injury, and only 10% (316 nuts) suffered distal injury (Table 1b). This shows that rats tend to inflict damage at the basal portion of the nuts. It seems that the basal portion of nuts is more accessible to rats than the lateral or distal portions; hence, the higher incidence of basal injury. Of the 3,199 damaged nuts recorded, 46% were large nuts, 30% medium and 25% small nuts (Table 1b). The fact that larger and more mature nuts provide greater nutrition than small and immature nuts may offer the explanation why rats show preference for mature nuts.

The magnitude of the loss to rat damage in the study area may be grasped by determining the value of 3,199 damaged nuts collected from 249 fruit-bearing trees in 50 weeks. At 15 centavos per nut, the loss was computed to be ₱479.55.

The monthly population-density indices of rats to coconut

Table 2 shows the monthly population-density indices of rats in the study area. There was only one species of rat, *Rattus rattus mindanensis* Mearns, caught in the coconut area for the whole trapping period. The population density index of rats did not vary much from month to month. Obviously, there was no relationship between the extent of damage to coconut and the rat population density indices in this study. It would seem that the standard trapping method for determining rat population-density index may not be reliably employed in a coconut area (Wodzicki, 1968).

Figure 2a. Varying types of injuries of nuts of different stages of maturity

Figure 2b. A pile of nuts showing the extent of damage incurred in a typical week.

Table 1-a *Number, size and injury of nuts damaged by rats in a study plot with 249 fruit-bearing trees in 50 weeks*

SIZE OF NUT	BASAL INJURY[1]			LATERAL INJURY[2]			DISTAL INJURY[3]			GRAND TOTAL
	Deep[4]	Superficial[5]	Sub-total	Deep	Superficial	Sub-total	Deep	Superficial	Sub-total	
Small (6-10 cm)	337	179	516	98	69	167	47	24	71	754
Medium (11-16 cm)	439	186	625	158	85	243	51	46	8	995
Large (More than 16 cm)	689	265	954	220	158	378	108	50	158	1490
TOTAL (All Sizes)	1465	630	2095	476	312	788	206	110	316	3199

[1] Injury was located at the peduncle
[2] Injury was located at the side
[3] Injury was located at the terminal portion
[4] Injury penetrating the hard shell
[5] Injury not penetrating the hard shell

Table 1-b *Rat damage to coconut, considering size, type and extent of injury to the nuts, expressed in per cent*

SIZE OF NUT	BASAL INJURY			LATERAL INJURY			DISTAL INJURY			Aggregate Damage*
	Deep	Superficial	Sub-total	Deep	Superficial	Sub-total	Deep	Superficial	Sub-total	
Small (6-10 cm)	44	24	68	13	9	23	6	3	9	24
Medium (11-16 cm)	46	19	63	17	9	25	5	4	10	30
Large (More than 16 cm)	46	18	64	15	11	25	7	3	11	46
AVERAGE (All Sizes)	46	20	65	15	10	25	6	3	10	100

*Total % damaged nuts according to size groups in relation to the total number of damaged nuts in one year.

Table 2. *Population density index of rats in the coconut grove*

MONTH (1969)	NUMBER OF BAIT INTAKE (G) TRAP NIGHTS	TOTAL RATS Reduction CAUGHT	TRAPPING Recovery INCIDENCE (%)
January	75	3	4.00
February	75	4	5.33
March	75	2	2.67
April	108	4	3.7
May	108	5	4.63
June	136	6	4.41
July	125	5	4.00
August	136	5	3.68
September	137	8	5.84
October	135	6	4.44
November	126	5	3.97
December	96	4	4.17
TOTAL	1332	57	4.28*

*Average per cent trapping incidence per month.

Empty rat nests were found at the palm crown. The nests were made of dried coconut leaves, grasses and rice panicles.

Rat-proofing as a method of controlling rat damage to coconut

The 10 unbanded trees showed a marked difference in the number of damaged nuts observed from the 10 banded trees used as control (Table 3). There were no damaged nuts observed from the 10 banded trees; whereas, in the 10 unbanded trees a total of 405 damaged nuts was recorded in 17 weeks with an average of 3 damaged nuts per tree per week.

To determine the economic feasibility of trunk-banding as a method of rat control, the cost of banding 10 trees was compared to the nuts lost in the 10 unbanded trees (Table 4).

The cost of trunk-banding 10 trees, including labor and materials, amounted to ₱22.80. The unbanded trees (control) suffered a loss of 405 nuts within the observation period of 17 weeks (4 months). At

Table 3. *Weekly incidence of rat damage to coconut in 10 banded and 10 unbanded coconut trees*

Date (1969)	TREATMENT	
	Banded	Unbanded
August 31	0	17
September 8	0	18
9	0	10
21	0	24
27	0	31
October 4	0	18
11	0	22
November 2	0	23
9	0	32
16	0	39
23	0	16
30	0	41
December 7	0	28
14	0	45
20	0	19
28	0	22
TOTAL	0	405

Table 4. *Cost of and computed saving from rat-proofing coconut trees*

ITEM	COST (₱)
3 pieces of plain G.I. sheets @ ₱4.80	14.40
Nails (2 kgm @ ₱1.20)	2.40
Labor (1 man — day)	6.00
Total banding cost	22.80
Value of damaged nuts (405 nuts @ 15¢)	60.75
Value of damaged nuts in one year	182.25
Net savings from trunk banding per year**	177.69
Computed savings per banded tree per yer	17.76

* Based on data obtained from 10 banded bearing coconut trees and 10 unbanded trees observed for 4 months.

** Savings from 10 banded trees, assuming that the material can last for 5 years.

the prevailing price of ₱0.15 per nut, the damage was computed at ₱60.75. Since the banded trees did not suffer any loss to rat damage for the duration of the study, then it is reasonable to assume that the nuts lost to rats in unbanded trees could have been saved if these trees were also banded. Based on the value of damaged nuts in 4 months, the value of damaged nuts in one year is computed at ₱182.25. Assuming, that the materials can last for 5 years the net savings from trunk-banding per year was computed at ₱177.69. This amount constituted the increment of production profit from banding 10 coconut bearing trees in one year, thus the computed savings per banded tree per year is ₱17.76.

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