THE EFFECT OF RAIN AND SHOWER IN THE FEEDING ACTIVITY OF COTABATO FIELD RATS[1]

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Confined rat populations composed mostly of ricefield rats (*R. argentiventer*) were baited continuously in the presence of rain and shower for 8 months in Buluan, Cotabato in 1961. Prolonged night rain, following three or more dry or rainless days, caused a significant decrease (P = 0.05) of 69.01% (range, 51.62-91.89%) in consumption of facts. No significant difference in intake levels was found as a result of short duration night rain, although a mean reduction of 45.63% (range, 27-61.91%) was noted. Prolonged or scattered night shower following a dry period caused a significant decrease (P = 0.10) of 54.08% (range, 47.85-65.97%) in intake. Postbaiting yields following rain or shower showed a recovery rate of 81.36%, 89.96% and 94.50%, based on original consumptions which indicate the influence of precipitation on feeding activities of rats. Successive night rain or shower caused a reduction of 46.38% (range, 20.28-61.87%) during the first night and a near complete recovery of 97.04% (range, 57.34-117.29%) in the second night, which shows the limit of rain or shower as a factor of reduction. Afternoon rain or shower following a series of dry days increased bait intake by 93.95% (range, 42.54-168.32%) showing significant difference (P = 0.05) in intake. To apply or discourage the use of acute poison on the basis of rainfall influence on rat movement and bait consumption would be an effective and intelligent procedure in rat reduction programs.

INTRODUCTION

Reports on the effects of rain on the feeding activity of field rats are few. Changes in the behavior of rats due to the influence of rain is known to result in accelerated damage to cereal crops before harvest (Sumangil, 1961). Feeding trends of Malaysian field rats (Harrison, 1949; 1953) indicate similar increase in food consumption following rain, particularly after a brief period of drought. However, Barbehenn (1962) interpreted

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the lack of statistical significance and general relationship between intake of dry rice bait and rainfall as probably due to the small population of ricefield rats employed by J. L. Harrison in his study and to other sources of variation.

In a previous study, (Sumangil, 1961) it appears that feeding oscillations are greatly influenced by the presence or absence of rain or shower, or both. Thus, this study was conducted to show the extent in which feeding activity is influenced by change in weather on the basis of its occurence and duration. Information of this type have essential importance in both practical and organized rat control programs, which may provide an approach to obtaining more economical and effective results particularly in the use of poison baits.

MATERIALS AND METHODS

The study area was a confined grassy and partly forested 4-hectare rectangular (400 x 100 m) plot located in a vacated army camp about 1 km southeast of Buluan, Cotabato. Luxuriant and thick vegetations composed mainly of separate or mixed stands of cogon (*Imperata cylindrica*) and talahib (*Saccharum spontaneum*) covered most of the area. Central Cotabato has a poorly defined seasonal climate with the period from December to May as the dry season and the rest of the succeeding months as rainy season.

An estimate of about 250 to 1,000 rats were within the plot at various phases of the study conducted from January to August, 1961. Based on previous sampling in the area, the majority of the animals were ricefield rats (*R. argentiventer*), with less than five per cent composed of roughly equal proportion of house rats (*R. r. mindanensis*) and bush rats (*R. exulans*).

Measured amounts (50-200 g) of binlid or rice shorts were exposed in each of over 200 bamboo feeding stations, with each tube opened at both ends and measuring at least 3 in. in diameter and 18 in. in length. About two-third of the total number of stations were established in 10- and 20-meter grids stretching along the broad length of the plot, the rest selectively exposed in rough areas containing trees and bushes spread along the opposing length of the study area. Bait consumption per station was computed from the remaining bait recovered daily. Rebaiting was continued with new supply of baits. Small amount of spillage, as estimated,

was further added to the recovered quantity, thus the results represented the total amount of bait consumed during the period.

Presence of rain and shower in relation to the time, duration, and intensity of their day and nighttime occurence were recorded continuously throughout the study period. In the absence of rain gage the word "rain" was used to describe moderate to heavy rainfall, while drizzles and very light intermittent rain were described as "shower". Their duration was termed "prolonged" when each recording was continuous in excess of one hour or were short recordings coming in series between calm. Rain or shower prevailing briefly (less than one hour) was described as "short" in duration.

All calculations to measure increase or decrease in bait intake due to weather change were computed against consumption levels recorded during the last of at least three consecutive dry or rainless days. Other bait measurements were accomplished by comparing bait intake recorded one or two days following the advent of a rain or shower to gain information on bait consumption recovery after a reduction was established.

RESULTS AND DISCUSSION

Prolonged night rain caused an average reduction in bait consumption of 69.01% (range, 51.62-91.89%) when compared to their original bait intake (Table 1) following a series of dry or rainless days, indicating significant difference ($F = 13.29$) by paired comparisons test at $P = 0.05$. No significant difference ($P = 0.05$) is shown from comparison of intake levels before and during a night rain of short duration (Table 2). The latter, however, caused a large average reduction of 45.63% (range, 27-61.91%) and lack of statistical significance may be due to the small sample size available. Prolonged or scattered night shower following a dry period reduced consumption (Table 3) by an average of 54.08% (range, 47.85-65.97%), indicating significant difference ($F = 4.10$) at $P = 0.10$.

In the absence of accurate rainfall measurement, duration of time involving change in weather seems to be a practical, if not an adequate gauge for the purpose of showing the degree of influence rain or shower, or both, have in bait consumption by field rats. It is apparent that in cases where high precipitation is present, length of time or duration of exposure to rain provides additional influence in reducing intake in bait stations. This is indicated by a difference in consumption rates of 23.38%, obtained by comparing the effects of prolonged and short duration night

Table 1. *The effect of prolonged night rain on bait consumption of ricefield rats following a dry period. Intake after rain shows recovery*

OBS.	BAIT INTAKE (G) Before	During	After	CONSUMPTION RATE (%) Reduction During Rain	Recovery After Rain
1	3,421	1,174	2,427	65.68	70.94
2	2,427	549	2,327	77.75	95.88
3	6,300	1,894	4,341	69.94	68.90
4	4,773	2,480	6,638	48.04	139.07
5	3,554	731	1,210	79.43	34.05
6	2,495	1,207	3,225	51.6[illegible]	129.26
7	3,960	321	1,741	91.89	45.10
Total or Average	26,930	8,347	21,909	69.01	81.36

Table 2. *Tha effect of night rain of short duration on bait consumption of ricefield rats following a dry period. Bait intake after rain indicates recovery*

OBS.	BAIT INTAKE (G) Before	During	After	CONSUMPTION RATE (%) Reduction During Rain	Recovery After Rain
1	6,470	3,554	7,009	45.07	108.33
2	3,084	1,175	2,119	61.91	68.71
3	2,715	1,982	2,105	27.00	77.53
4	1,843	962	1,462	47.81	79.32
Total or Average	14,112	7,673	12,695	45.63	89.96

rain following a period of dryness. Similarly, prolonged or scattered night shower caused greater reduction than short duration night rain as shown by a difference in mean of 8.55% between their feeding rates following a series of dry days. This further shows the extent in which duration of exposure restricts bait consumption where prolonged exposure under comparatively much lower precipitation causes greater decrease in consumption than those resulting under the influence of greater rainfall recorded within a shorter time.

Further comparisons (Tables 1, 2 and 3) indicate reduced but still high postbaiting yields following rain or shower averaging 81.36%, 89.96%,

Table 3. *The effect of prolonged or scattered night shower on bait consumption of ricefield rats following a dry period. Intake after shower indicates recovery*

OBS.	BAIT INTAKE (G) Before	During	After	CONSUMPTION RATE (%) Reduction During Shower	Recovery After Shower
1	6,426	3,251	5,805	47.85	90.33
2	6,781	2,308	7,324	65.97	129.46
3	1,769	698	2,698	60.54	152.51
4	2,495	1,267	3,225	49.22	102.95
5	4,634	2,414	2,657	47.91	57.34
6	4,098	2,095	3,053	48.88	74.49
Total or Average	26,203	12,033	24,762	54.08	94.50

and 94.50% in rates of recovery from their respective original consumptions. Apparently, exposure to varying changes in weather, in this case the amount of precipitation and its probable effects on the habitat, strongly contributes to the relative inactivity of the rat population.

The effect of successive night rain or shower on bait consumption following a series of dry days (Table 4) shows an average drop of 46.38% (range, 20.28-61.87%) during the first night and a near complete recovery of 97.04% (range, 57.34-117.29%) in the second or succeeding night. The latter shows the apparent loss of influence rain or shower, or both, have in limiting movement and reducing feeding activity. This further

Table 4. *The effect of successive night rain or shower following a dry period on the bait consumption of ricefield rats*

OBS.	INITIAL TAKE (G)	INTAKE DURING RAINY NIGHT 1st Night	2nd Night	CONSUMPTION RATE % Reduction (1st Night)	% Recovery (2nd Night)
1	14,626	8,788	13,305	30.08	90.96
2	11,159	4,225	13,089	61.87	117.29
3	2,084	1,175	2,119	43.62	101.68
4	3,053	2,434	3,333	20.28	109.28
5	4,634	2,414	2,657	47.91	57.34
Total or Average	35,556	19,066	34,503	46.38	97.04

suggests the importance of securing food during which the population may or may not have become conditioned to the existing weather condition.

Bait consumption after an early or late afternoon rain or shower preceded by a series of dry days results in vigorous increases (Table 5) in the rate of bait intake averaging 93.95% (range, 42.54-168-32%), or nearly twice the previous level of consumption. The difference in mean is significant ($F = 8.86$) at $P = 0.05$. This probably explains the general observation of greatly increased rat damage to standing crops, particularly rice and greening corn, following an afternoon change in weather.

The use of poison baits in rodent control hen undertaken without proper knowledge of the influence of changing weather on populations composed markedly of ricefield rats generally lead to considerable waste of time, effort, and material. To apply such control materials when the chances of increased consumption are assured, as well as avoid or discourage their application when rats are expected to react with reduced activity, would be an effective and intelligent procedure in rat reduction works, particularly where acute poison baits are employed.

Table 5. *Bait consumption after afternoon rain or shower by field rats following a period of dryness*

OBS.	BAIT INTAKE(G) Before	During	INCREASE OVER PREVIOUS TAKE (%)
1	1,518	3,900	156.91
2	1,462	2,084	42.54
3	1,247	3,346	168.32
4	2,264	3,918	73.06
5	2,105	3,424	62.66
Total or Average	8,596	16,672	93.95

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