PROTECTING RANGE FORAGE PLOTS FROM RODENTS

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Rodents frequently become a problem in rangeland seeding trials. Experimental plots, even up to 20 acres or more in size, often suffer considerable loss of seed or seedlings due to the depredations of rodents (Howard, 1950). Unless protection from rodents is supplied in these instances, it is difficult to evaluate the adaptability of the various forage species to a given site with respect to weather and soil conditions. Also, rodents can be of considerable annoyance when one wants to take yield measurements and they have caused large openings in the stands.

A successful attempt to protect a 20-acre seeding of wheatgrasses and other forage trials from rodents was made on the Flournoy Range Demonstration Project near Likely, Modoc County, California. Abandoned service station one-quart oil cans were used as bait stations. The cans were placed 50 to 100 feet apart (Fig. 1). More than 300 cans have now been used in various parts of the state.

The 1¼-inch opening made in the oil cans by the standard punch-type opener is just the right size to admit field rodents up to and including kangaroo rats (*Dipodomys*). Ground squirrels (*Citellus*) cannot enter the cans, but they are able to reach in and pull poison grain out. Other genera that we controlled with the cans included deermice (*Peromyscus*), pocket mice (*Perognathus*) and harvest mice (*Reithrodontomys*). This simple method of rodent control around plots should work just as well in other areas. It should provide protection for seeds and seedlings for at least one year.

Our first attempt at controlling the rodents on the 20-acre study area was to poison them by the conventional method of broadcasting poison grain. This was done on June 16, 1955, by Loring White, Modoc County Agricultural Commissioner, who cooperated in the study. We knew this method would not keep rodent numbers reduced for many months (Spencer, 1955), even if the area had been larger; and, as Commissioner White also predicted, the rodents quickly reinvaded the relatively small area following their control. This was borne out 1½ months later when 29 mice were trapped on the 20-acre poisoned area in 200 trap nights. In comparison, only six rodents were trapped during the same period with equal trapping on the undisturbed check area (Table 1). One reason for the higher population of certain species of rodents on the study area is that the habitat conditions present there were more favorable. Whenever man alters the natural environment, certain species of rodents may become sufficiently numerous to then be classed as a pest (Howard, 1953). The habitat was made more favorable for certain species of rodents as a result of disking under the sagebrush, which improved cover conditions, and seeding to wheatgrasses, which increased the variety and the quantity of the food supply.

The bait cans were placed 50 to 100 feet apart on the area on November 1, 1955. When the site was retrapped five months later, no ro-

FIGURE 1. Bait stations for use in controlling range rodents in the vicinity of field plots. They are made from discarded service station one-quart oil cans.

Table 1. Percent reduction of rodents on a 20-acre plot five months after poison-bait cans were put out. A trap night equals one trap set one night.

Date	No. Trap Nights Each Area	Species	20-Acre Study Plot	Bulldozed Check Area	Undisturbed Check Area
		Peromyscus maniculatus	Not trapped	14	Not trapped
4/19/55	182	*Reithrodontomys megalotus*		3	
				—	
				17	
6/16/55	—	—	Poisioned by broadcasting bait	—	—
		Peromyscus maniculatus	19	8	3
		Dipodomys ordi	4	2	3
7/26-27/55	200	*Reithrodontomys megalotus*	4	1	0
		Perognathus parvus	2	0	0
			—	—	—
			29	11	6
11/1/55	—	—	Put out poison bait cans	—	—
		Peromyscus maniculatus	0	20	6
		Dipodomys ordi	0	0	2
3/27-28/56	200	*Reithrodontomys megalotus*	0	5	0
			—	—	—
			0	25	8

dents were captured in 200 trap nights (Table 1). This is an unusually good control for such a long period of bait exposure. The bait was in good condition and had not mildewed as a result of the winter snow and rain. On smaller sites, with fewer bait cans, it is probably desirable to have the cans closer together and to replace poisoned bait every few months. Bait should always be replaced with fresh material. Some individual rodents will develop bait-shyness (Tevis, 1956), but to help overcome this, different poison-bait combinations can be used in separate cans. However, do not mix poisons in any one can. If success drops off, change the kind of bait and kind of poison.

Discarded one-quart oil cans are readily available at service stations or city dumps. Since the cans we picked up from a city dump had been burned, they were dipped in a dilute solution of black asphalt (varnish) to preserve them from rust, although this it not necessary, if the cans are going to be used for only a few years. Cans that we obtained from service stations were drained overnight to allow all the oil to drain out. Then a little soil was shaken around in them to absorb any oil that might have remained.

Poisons and baits used in different cans included oat groats with three ounces of 1080 poison per 100 pounds of bait, whole wheat with 8⅓ ounces of strychnine per 100 pounds of bait, and a small amount of two percent Endrin dust. Other poison baits, such as the safer anticoagulant materials, can also be used. The Endrin as a contact poison was not effective. Cotton was added to many of the cans, but it did not seem to be of any particular advantage. Occasionally mice died in the cans. We do not know if such cans were rendered ineffective while the carcass was present.

In some of the cans the strychnine-coated wheat was embedded in a solid pack of paraffin to preserve the grain for a longer period. All paraffin baits were utilized to some extent by mice. The paraffin may have been of some value, but at this time we can only recommend the use of grain baits without the addition of paraffin, as all grain baits held up well even without paraffin. In more recent trials we have poured a small amount of "office supply" rubber cement over

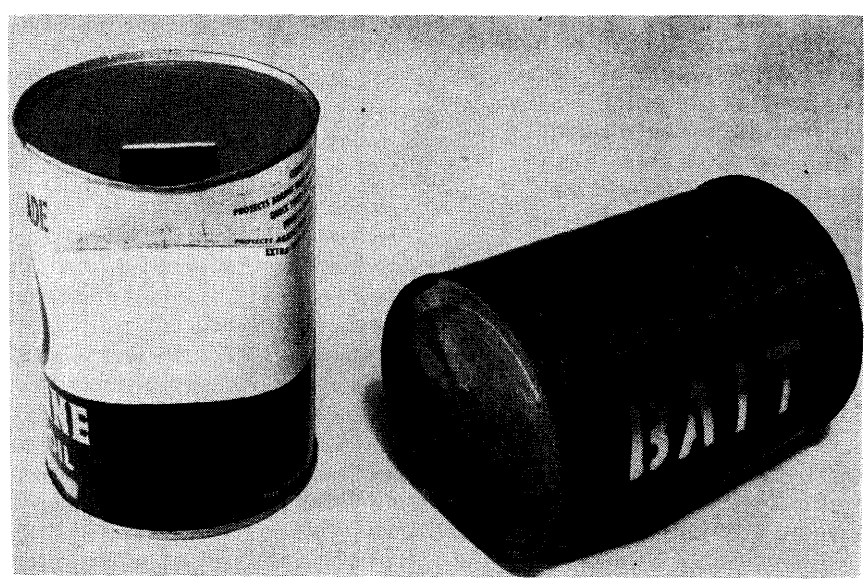

FIGURE 2. A crease is made on one side of the bait can just behind the 1¼-inch opening to help keep bait in and ground water out.

the kernels and then shaken the can to make sure that each kernel is coated. This adheres the kernels together so that there is no chance of livestock or game spilling the poison bait from the cans. We do not know whether this will reduce acceptance of the bait. Paraffin is not convenient when rebaiting cans in the field, and it melts when the sun shines on the cans in summer.

To keep ground water from entering the cans we dented them an inch or so below the opening (Fig. 2). This crease was made by rolling the can along the edge of a table or board. The ridges also prevented grain from spilling out of the cans.

In another study by Howard, *et al.*, (1956) to learn what propensity a kangaroo rat has for gathering broadcast seeds (hence to determine the need for rodent control at forage trial plots) 300 grams of rose clover seeds were scattered in a room with 500 square feet of concrete floor space. One kangaroo rat from the San Joaquin Experimental Range was released in the room. It ate on the average of between 12 and 13 grams (3400 to 3500 seeds) per day, and in one night cached an additional 59.4 grams (16,000 seeds). This means that on the night of peak activity the kangaroo rat must have picked up about 20,000 individual rose clover seeds (equal to one pound per week). Kangaroo rats gather seeds by picking them up individually, using both forefeet, and then tossing them into their external cheek pouches. It is not known how many pouches the 70 grams of seed represented.

Summary

Service station used quart oil cans show considerable promise as being effective bait stations for protecting rangeland seeding trials from rodents. They are readily available, light to transport, and effectively protect grain baits from snow and rain. The bait supply may have to be replenished every few months on small plots, but fresh bait twice a year should be adequate to protect areas of many acres in extent.

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