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Rodent Control in Direct Seeding Through Use of Poisons

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RODENT CONTROL IN DIRECT SEEDING THROUGH USE OF POISONS

Introduction

Peromyscus, the Deer mouse, is one of the main obstacles to successful reforestation by direct seeding in the Pacific Northwest and many different control measures have been experimented with over a number of years. Poison has been used for some time with varying degrees of success in the United States as a means of control but its application has never been popular in British Columbia partly because of a widespread opinion that its use on a large scale would kill many other mammals and birds besides mice and would "upset the balance of nature." This opinion, however, is not founded on facts and it should be realized also that any balance of nature which may have previously existed in the forest is abruptly upset by the sudden transition to cut-over land by the widespread logging. In actual fact, the increase in numbers of certain birds and mammals, including deer mice, is a direct result of this transition.

Control by poison in direct seeding projects in Oregon and Washington is supervised by the United States Fish and Wildlife Service who prepare the bait and make the necessary recommendations for its application. A careful check is kept on any possible harmful effects and the minimum amount of poison bait is used. In the past Thallium Sulphate was extensively used and this poison, which is toxic to all forms of animal life, is a relatively slow-acting poison affecting the central nervous system. It has certain disadvantages both in its preparation and application in the field and is not used so much at the present time. The bait is soaked in a prescribed solution and then scattered on prepared spots as it takes from six to seven kernels of grain to kill a mouse. The poison itself is not readily soluble in water so the bait will remain toxic on the ground for some time.

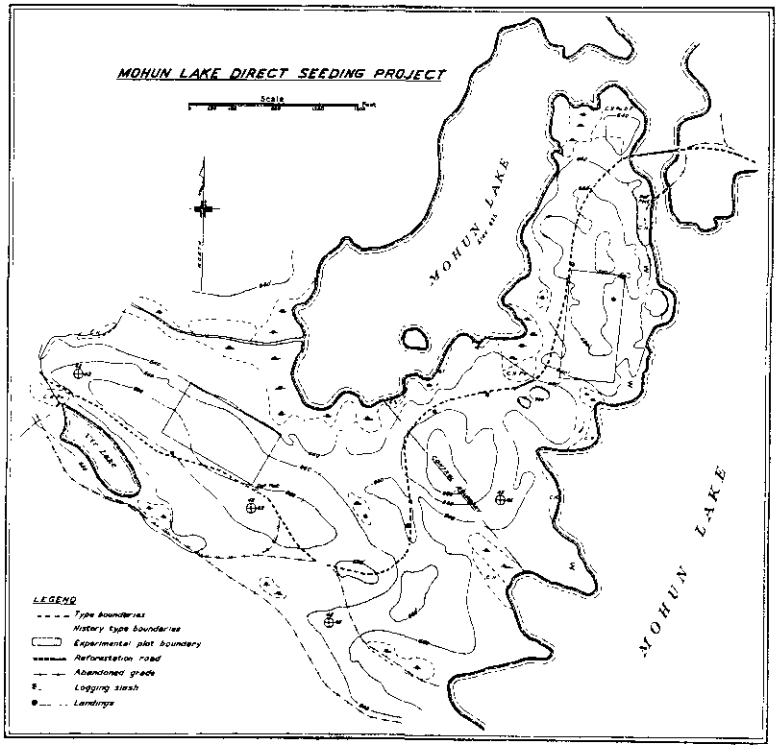
Since the last war a new poison, Sodium Fluoroacetate, has been evolved and has proved to be a very effective rodenticide. It is more commonly known as 1080 since it was the 1080th compound tested for its toxic effects on animals by the Wildlife Research Laboratory of the United States Fish and Wildlife Service in their search for new rodenticides. It is an extremely toxic poison affecting all forms of animal life, with no known antidote, so that stringent regulations have been set up regarding its sale and particular care is necessary in preparing and handling any bait. Compound 1080 is a fast-acting poison affecting the central nervous system and heart muscles and only one kernel of wheat soaked in a prescribed solution is necessary to kill a mouse. In addition, it has an attractive taste so that mice will eat it readily. It can also be scattered broadcast. It is very soluble in water so that it leaches out quickly after application in the field and its use has to be correlated with fine weather, four clear nights after application being considered necessary for optimum results.

Compound 1080 is now being used in nearly all direct-seeding projects in the Northwest and the general procedure is to broadcast the bait by air in late Fall or Spring and then to seed some weeks later in the same manner. A buffer strip, one quarter of a mile in width around the area to be seeded, is also poisoned to prevent mouse infiltration before germination is complete. Checks on the rodent population are made before poisoning and the amount and strength of poison to be used are based on the results of these.

The Project

The possibilities of experimenting with 1080 were stimulated both by the success obtained with this poison in Oregon and Washington and by the discouraging results obtained from other control measures in experiments carried out over a number of years. In addition, personal contact was made with Mr. A. W. Moore of the United States Fish and Wildlife Service who has been working on rodent problems for many years. His advice on the preparation of the bait, its application in the field, and other aspects of this project are gratefully acknowledged.

The primary objective was to find out what effect pre-poisoning an area with bait prepared with 1080 would have on the subsequent germination of Douglas fir seed sown on seed spots as compared to a similar amount of seed sown on an adjoining unpoisoned area. Accordingly an area, which is shown on the map, was selected in the Sayward Forest, one seeding plot being established on the peninsula which is almost surrounded by Mohun Lake and the other plot near Vic Lake. It was proposed to poison the whole peninsula as far as the control boundary which was one quarter of a mile from the plot. The lake substantially reduced the area of the buffer strip. The plot near Vic Lake was put in as a check and was not to be poisoned.



(a) Poisoning

The bait was prepared with a prescribed solution of 1080. Extreme care is necessary as the poison, which is a fluffy white powder, can be inhaled and also assimilated into the body from cuts and bruises on the hand. All utensils used in such work are specially labelled and reserved for that purpose alone. The United States Fish and Wildlife Service dye the poisoned grain (usually wheat) a bright green to repel birds but in this project this was not possible as the manufacturers had mixed a purple dye in the powder. This was done as a precautionary measure as the pure solution is colourless.

The whole peninsula of 130 acres was poisoned on March 28, 1950, as soon as snow had left the area and the complete operation took 5 hours. The poisoning crew was made up of 4 men who distributed the bait while a fifth acted as compassman. Each of the four men was equipped with rubber gloves, a planting bag containing a known amount of bait, and a tablespoon which, when filled, contained a known approximate number of kernels. The bait was broadcasted at the rate of 1 tablespoonful every 50 feet on lines which ran East and West across the peninsula at 50 foot intervals. The compassman walked ahead of the poison crew on every fourth line marking it with paper so that the same line was not repoisoned on the return journey.

Poisoning was completed in fine weather but snow fell for part of the next day and night and the area was covered with half an inch of snow the following morning. The remainder of the third day and night were fine but very heavy rain began on the fourth day continuing all night. The weather at this time of year is very unsettled making it difficult to obtain the requisite number of clear nights.

(b) Seeding

Forty 4-milacre quadrats were established on both the check plot and the one on the peninsula. On both plots the procedure was the same, there being 5 rows of quadrats 3 chains apart and, on each row, 8 quadrats at 1 chain interval. Ten Douglas fir seeds[1], which had been stratified for 72 days, were sown on each of the milacre quadrats making a total of 160 seed spots for each of the two areas. The seeding was all completed on April 5, 8 days after poisoning.

1. Mean germination 86.1 per cent. Standard Deviation 3.6 per cent based on 10 samples of 100 seeds, each tested for 15 days in a Hearson Incubator.

Results

1. Effect of the Poison on other Wildlife

One of the objectives of the project was to show that no harm would be caused other wildlife by this method of control.

The Provincial Game Commission were anxious to have some of their staff present on the area after poisoning had taken place in order that any effects on other wildlife might be observed, and two of their personnel inspected part of the area on March 31. No trace whatever of any dead animals or birds was recorded on this or any other occasion. Wrens and robins were personally observed on the area before poisoning and these were observed in the same locality for some time after. No dead mice were found as they have time to conceal themselves before dying. This is desirable as it considerably reduces the chances of secondary poisoning through another animal eating the bodies of any rodents killed.

Provided that poisoning is carried out late in the Fall or early in the Spring there is no reason why any harm should be caused to other wildlife. It should be stressed, however, that the use of a poison as toxic as 1080 should be restricted rigidly to qualified personnel using predetermined amounts of a recognized concentration of the poison.

2. Rodent Population

The areas surrounding the two plots were first trapped in August, 1949, and the catch was heavy indicating that many mice were present. Owing to the uncertainty of the weather immediately prior to poisoning, only a few traps were set the night before it took place, but the catch showed that the population was high for that time of year. The effects of the poison were subsequently checked by trapping the areas around both plots simultaneously with ordinary mouse traps for one or two nights. Trapping on the poisoned area was carried out along the sides of the road from the long trestle bridge at the North end to the control boundary and on the unpoisoned area along the road from the reference post to Vic Lake. On both areas other trap lines were put in at random at right angles to the roads so as to sample as wide an area as possible.

Both areas were trapped two days after poisoning took place, 4 mice being caught in two nights in 260 traps on the poisoned area as compared to 10 mice in 92 traps on the unpoisoned area over the same period. One of these 4 mice was caught just inside the control boundary and could have infiltrated over during the night. For the next 4 times that trapping took place in April, May, and June, no mice were caught although on each

A comparison of germination from the two plots revealed that a significant difference existed. Thirty-six out of the 40 quadrats on the poisoned area contained 1 or more seedlings as compared to 11 of the 40 quadrats on the unpoisoned area; or 66 of the 160 poisoned seed spots contained 1 or more seedlings against 12 of 160 unpoisoned. On further analysis the mean germination per quadrat on the poisoned area was 3.87 as compared to .47 on the other. The seed spots on this latter area were almost entirely wiped out by mice but a considerable amount of seed was also eaten on the poisoned area. This was due to survivors which had not been killed by the poison and the two main reasons for this loss of seed can be attributed to:

(a) The Weather. The requisite number of clear nights after poisoning was not obtained and both snow and rain likely reduced the potency of the bait. This will soon lose its effect if its strength is reduced as it has been found that, if a mouse eats a non-lethal amount of bait and survives, it is unlikely to eat more. Fall poisoning and seeding has decided advantages as the weather can be forecasted with some degree of accuracy and a second poisoning could be carried out if necessary. Unstratified seed could also be used as the disadvantages of handling large quantities of stratified seed on a tight schedule are obvious. A long winter with persistent snow could delay poisoning to such an extent that seeding could not take place till well into April.

There should also be little danger of infiltration with Fall poisoning and seeding, provided that poisoning was successful and there was a buffer strip, as both numbers and ranges of mice are considerably reduced during the winter months.

(b) The Method of Seeding. The present method of seeding is not to be recommended in future for a variety of reasons.

Firstly, mice find the seed by its smell and naturally where seed is concentrated on a spot it is located more easily. Moore (1) says that there is bound to be a relatively high loss of seed on seed spots in spot seeding as mouse-control is control and not extermination and the few survivors are attracted by the odour of the seeds on the spot. Silen (2) also substantiates this and declares that individual placement of seed is a better method as there is known proof that the concealment of seed from mice is an important factor in the regeneration of natural stands.

Secondly, the subsequent development of seedlings from a multiple seeded spot is not satisfactory as the trees eventually grow together at the base and form a clump. A new type of seed gun is now being developed by Silen and this sows one pelleted seed at a required depth. This type of seeding gun should both reduce seed loss and produce a satisfactory stand.

occasion mice were caught without difficulty on the unpoisoned area near the check plot. At the last occasion that trapping took place on July 13, 6 young and sub-adult mice were finally caught on the poisoned area which showed that the area was gradually being repopulated. A final summary of the catches recorded on both areas from shortly after the time of poisoning to July 13 showed 10 mice caught in 790 traps on the poisoned compared to 43 in 372 traps on the unpoisoned area.

Results indicate that the poison had substantially reduced the population to a point well beyond the date that final germination might be expected. It is inevitable that some mice would survive the poisoning and the results of their breeding were apparent in July so that, by the Fall, this area should be completely repopulated. Poisoning, therefore, only temporarily reduced the population and this is in itself desirable as mice may possibly have a beneficial as well as a harmful role.

To obtain the best results, poisoning should be carried out when the mice have stopped breeding in the Fall or before they begin in the Spring. In this case the first signs of pregnancy were observed in the unpoisoned area on May 21.

The approximate rate of infiltration was also studied by leaving a line of permanently set traps along the control boundary. These were examined at intervals from March 30 to June 12 and results showed that, though the rate of infiltration was slow, a buffer strip is very necessary.

3. Results of the Seeding

The first germination from the seed spots was recorded on May 4 and was practically all complete by June 12. Each seedling was marked and not considered established until it was tough enough to repel mice and junco attack. This is characterized by the stems and cotyledons being cut and occurs during the first few weeks after germination while the seedling is still tender. Some damage of this type occurred but it was not serious and was not recorded after June.

There was mortality later in the summer months through heat and drought and this was inevitable since neither site was particularly suited for direct seeding. The importance of careful selection of site in future large-scale projects can not be over-emphasized as satisfactory rodent control will be of little use if there is a heavy seedling mortality later. In this project, however, the primary objective was to determine the effect of poison bait on rodents and the area selected was particularly well suited for this purpose.

Plate No. I

A member of a poisoning crew with gloves, planting bag, and spoon. A storage can for the bait is at his feet.

Plate No. II

New type of seed gun sowing one pelletted seed per spot.

Plate No. III

Poisoned area in the foreground, the second morning after poisoning.

Conclusions

Rodent control with the poison 1080 would appear to have wide possibilities and further work based on the results of this project should produce more satisfactory results. In addition it is unlikely to have any harmful effects on other wildlife provided it is used carefully.

This project has, therefore, terminated on an encouraging note as, at long last, some satisfactory control of the Deer mouse is in sight.

References Cited

(1) Moore, A. W. United States Fish and Wildlife Service, Oregon. Unpublished Report 1949.

(2) Silen, R. A Walking Stick Planter for Pelleted Douglas Fir Seed. Yale School of Forestry Publication 1948.