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CONTROL OF GRASSHOPPERS IN IDAHO

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CONTROL OF GRASSHOPPERS IN IDAHO

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Within the past few years a great deal of experimental work has been carried on in the western states in an attempt to improve upon the methods of controlling grasshoppers.* The results obtained show that methods suited to one locality may not be effective in another place. These conclusions have resulted in considerable variation in the recommendations published for the control of grasshoppers. It is advisable, therefore, to keep in mind the particular region infested when selecting a means of control.

It is the aim of this bulletin to present the methods that have given the best results under Idaho conditions.

Several methods have been used with more or less success in the control of these insects. The more important ones are as follows:

1. The spreading of poisoned bran mash.
2. The destruction of the egg masses.
3. The use of hopper dozers.
4. The utilization of turkeys and chickens.

*The writer wishes particularly to acknowledge the work of C. L. Corkins, formerly of the Colorado Experiment Station, and R. A. Cooley, J. R. Parker and A. L. Strand of the Montana Experiment Station, whose publications have been drawn upon freely in the preparation of this bulletin.

POISONED BRAN MASH

Poisoned bran mash has been found by far the best control measure. Numerous formulas have been used but the following has been found the most satisfactory:

Coarse bran (free from shorts)	100 lbs.
Sodium arsenite	1 pt.
Salt	5 lbs.
Cheap molasses	2 gal.
Amyl acetate	3 ozs.
Water to moisten	about 8-10 gal.

Bran:

Coarse bran, free from shorts, not only mixes better and spreads more satisfacorily, but also can be purchased somewhat cheaper. Under some conditions sawdust has

been used with satisfactory results as a substitute for the bran. Under dry land conditions in this state sawdust has often given as good results as bran, but under irrigated conditions there are cases where it has been much less effective. The distinction seems to be that where food is parched and dry, hoppers will eat the sawdust freely, but where it is green and succulent, as in an irrigated section, hoppers avoid it more than bran. If sawdust is to be used, it should be old enough to have lost its strong, fresh scent, as this odor seems to repel the grasshoppers. It should be sifted to remove the coarser particles. A mixture of half bran and half sawdust often has proved efficient. When such a mixture is used, the proportions should be determined by measure, rather than by weight, owing to the fact that the difference in moisture content of the sawdust will cause a great variation in weight.

Straight bran has been tried more thoroly and has given the best results, while the mixture of bran and sawdust and the straight sawdust are close second and third in the order mentioned.

Sodium Arsenite:

This is the poisonous part of the bait and has been found to be the most satisfactory for several reasons: First, because it kills the grasshoppers fully as well as the other poisons used; second, it is considerably cheaper; third, it is in liquid form and is more easily and uniformly mixed than the powders; fourth, in handling large quantities of this poison there is not the danger of irritation to the mucous membranes, face, etc., that there is when the powder forms one of the arsenicals is used. The dry forms are more poisonous on the face and nostrils because they float in the air. Sodium arsenite, however, is more caustic on the hands and if it is necessary to handle large amounts of the moist mash on successive days, gloves should be worn to prevent sores being formed on the hands and under the fingernails.

In case sodium arsenite is not obtainable at the time it is needed, five pounds of crude arsenic or four pounds of either white arsenic or Paris green may be substituted for the pint of sodium arsenite.

Salt:

Any cheap grade of salt that will dissolve readily in water is satisfactory and makes the bait more efficient by adding to its attractiveness.

Molasses:

The cheapest molasses obtainable is recommended. A low grade of sugar beet molasses is generally used. Spoiled molasses frequently obtainable at a low price at grocery stores serves the purpose very well. The molasses is used because it not only sweetens the bait but also prevents it from drying out as quickly as it otherwise would, thus retaining its attractiveness to the grasshoppers over a longer period of time.

Amyl Acetate:

This chemical gives off a rich, banana-like odor and adds greatly to the attractiveness of the bait. In using this, one should be careful never to use more than the amount called for in the formula since too much of it will give such a strong odor to the bait that it will repel the grasshoppers rather than attract them. It is suggested that when procuring the amyl acetate the purchaser have three ounces measured out in a bottle and the bottle marked so that the exact amount may be used each time a batch is mixed. In case amyl acetate is not obtainable at the time the bait is being prepared, two dozen lemons or oranges will make a good substitute. If these are used they should be finely ground in a food chopper before mixing with the other ingredients. They make the bait practically as attractive as the amyl acetate but their greater expense makes them less desirable.

MIXING POISONED BRAN MASH

If the formula given above is used, the mixing of the mash is a very simple operation. The bran is spread out in a wagon box or on a tight floor to a depth of about 6 inches. The salt is dissolved in the water and the molasses, amyl acetate and sodium arsenite added and well stirred. This mixture is then poured slowly over the bran and the bran thoroly stirred as the liquid is poured so that *every particle of bran becomes moistened.* It is important that the mash be made just moist enough so that it will not stick and form lumps. It should have just enough moisture so that it will crumble into small flakes when sown broadcast.

If one of the powdered forms of poison is used, the powder is sifted slowly into the bran and thoroly mixed before any of the liquid is added. It is essential that this operation be thoro if the bait is to be effective, for poor results will invariably be obtained if this operation is not well

done. Aside from this preliminary mixing of the bran and powder, the rest of the mixing is the same as before mentioned.

When the bait is prepared with sawdust, or a mixture of bran and sawdust, better results are obtained if the mixture is made in the evening and allowed to stand over night.

SCATTERING POISONED BRAN MASH

The usual method of scattering the mash is to sow it by hand, much as one would broadcast grass seed. It should be thrown with a snap of the wrist so that it completely separates into flakes rather than falling in large lumps. Where considerable amounts are to be scattered, it makes the work much lighter to sow it from the back of a wagon. The usual tendency in distributing the bait is to sow it thicker than necessary. The amount called for in this formula should cover from 10 to 15 acres and, therefore, must be sowed quite thinly to make it cover this amount of ground. Sow it as thinly as possible and still cover all the ground is about as good a rule as any for the beginner to follow. In spots where the grasshoppers are exceedingly numerous the bait should be sown somewhat thicker.

WHEN TO PUT OUT BAIT

In putting out grasshopper bait, the work should be so timed that the operation will have been completed and the bait still fresh and attractive at the time the grasshoppers are feeding the heaviest. The time of heaviest feeding varies greatly in different sections of the country, but it appears that under Idaho conditions this period is reached about noon. Therefore, the bait should all be scattered by eleven a. m. The most recent experimental work indicates that between eight and eleven a. m., is the best time to sow the mash, altho some workers prefer sowing it very early in the morning. If the nights are warm and dew is present, the earlier time probably would be better but where the nights are cool and dry the later time is thought to obtain the better results. On very windy days or cool, cloudy days the grasshoppers feed but very little and the larger part of the bait is lost, if put out on such a day. Therefore, *the bait should always be scattered on warm, clear days when it is not windy.*

TIME OF THE YEAR FOR POISONING

The best time to start poisoning grasshoppers is as soon as they are noticed in large numbers. The younger grasshoppers are more easily poisoned than are the adults and, therefore, an early start has two distinct advantages: it stops their feeding before they have done as much damage as they would otherwise, and, as before mentioned, they are more easily brought under control at that time. This statement, however, should not be construed to mean that this is the only time the grasshoppers can be controlled, for usually such is not the case. Every year numerous outbreaks are brought under control after the grasshoppers have reached the adult stage, but an earlier start is more desirable.

In some localities, such as are found in many of the mountain districts and dry land sections where hoppers deposit their eggs mostly in pastures or hills adjacent to cultivated areas, severe injury can be avoided only by making examinations of the surrounding country and applying the poisoned mash where the young hoppers are congregating after emerging from the eggs and before they start to migrate or scatter to any extent.

WHERE TO SOW BAIT

Grasshopper bait always should be scattered where the grasshoppers are actively feeding on the day the bait is put out. Occasionally the bait is sown around the edges of the fields into which it is expected that the grasshoppers will be moving, but this method never is as successful as sowing it where the grasshoppers are at the time the bait is put out. Large numbers of grasshoppers may be killed at very slight expense in clover and alfalfa fields by leaving narrow strips a yard or so wide uncut in the center of each field or every 100 to 200 yards when mowing the hay. In about two or three days most of the grasshoppers in the field will have gathered on these strips. The bait then is thickly sowed, there usually resulting in the poisoning of very large numbers. A day or two after bait has been put out, the strips may be cut and the hay removed from the field.

DANGER OF POISONING STOCK

In this connection, the question frequently arises, "Isn't there danger of poisoning stock, chickens, birds, etc?" If the bait is thinly scattered according to directions, there is no

danger. This mash has been distributed in pastures where stock was grazing at the time with no poisoning resulting. If, however, the poisoned bran mash is allowed to fall in large lumps or piles, there is then the possibility that livestock, chickens, birds, etc., may feed at these piles and be poisoned. This and the fact that the grasshoppers do not feed at the piles as readily as they do upon individual flakes makes it necessary that the bait be well scattered. An excessive amount of shorts in the bran or the use of too much water is the usual cause of the bait not mixing and scattering well. This point, therefore, should be carefully observed in purchasing supplies and in mixing.

Chickens, turkeys and all other fowls are quite resistant to arsenical poisoning and will not be poisoned by any amount that they may pick up when the bait has been properly scattered. It should be remembered, however, that sodium arsenite is a deadly poison and that any amount that is left after mixing the bait should be carefully labeled and put away where it cannot be reached by children or by domestic animals.

LOOKING FOR RESULTS

Those inexperienced in fighting insects frequently expect to go into fields a few hours after scattering the poison and find the grasshoppers all dead. This would be very desirable but unfortunately, under practical conditions, it never works out that way. The poison works quite slowly and it is usually from three to four days after scattering the bait before the heaviest kill is obtained and even then it never is possible to secure a complete kill but grasshoppers can be thinned out until those remaining will do a comparatively small amount of damage. Three or four days after the application, a close inspection should reveal numerous dead hoppers lying around under clumps of grass, clods and other similar places. If it is desired to kill them quicker, the amount of sodium arsenite may be doubled, but this is not recommended as it increases the expense proportionately more than it increases the efficiency of the bait.

DESTROYING THE EGG MASSES

Destroying the egg masses is a very efficient and economical method of destroying the grasshoppers but is practicable only in a small percentage of the cases in Idaho. Most of the injurious species of grasshoppers deposit their eggs over extended areas. Some of them, however, congre-

gate in large numbers in soddy places or on knolls during the time of egg laying and millions of eggs will be deposited in a comparatively small area. When this is observed, disking or spring-toothing these areas will destroy great numbers of eggs at very little expense. Egg deposition occurs late in the summer or early in the fall at which times the females may be observed burrowing small holes in the ground with their abdomens and depositing their eggs in masses at the bottom of these holes one-half to three-fourths of an inch below the surface. As a part of grasshopper control work, this operation should be watched for and where eggs are deposited in large numbers, they should be destroyed by the method mentioned. In the case of hoppers that lay their eggs along ditch banks, roadsides and in alfalfa fields, this system is very effective. This destruction of eggs should be done as late in the fall as possible but before the ground freezes.

HOPPER DOZERS

This is an old method familiar to most people who have lived in districts where grasshoppers are injurious. It consists of mounting long shallow pans on low runners with a frame at the back and ends covered with oil cloth, tin, or some other material difficult for the grasshoppers to cling to. Water is then placed in the pans, a small amount of coal oil placed on the water and the dozers dragged or pushed by horses through the fields infested with grasshoppers. As the dozer approaches, the grasshoppers leap into the air and are caught in the pans and the oil on the water kills them. If the crops in the field are in such a condition that this method can be used and the ground smooth enough to permit its use, very large numbers of grasshoppers can be destroyed. In most instances, however, where this method has been used it has been found that, altho the number of grasshoppers killed was very large, there were still so many left that the injury continued almost as severe as before the dozer was used. In almost no instance can as large a percentage of the hoppers be killed by this method as by the use of poisoned mash. For this reason and the fact that the expense is practically as great, and the area that can be covered is so much less, it is recommended that, except in special cases, the poison bran mash be given preference.

TURKEYS AND CHICKENS

Turkeys and chickens will effectively keep grasshop-

pers under control where the number of fowls is large enough or the fields to be covered not too extensive. This means of control has the advantage of not only killing the grasshoppers but furnishing an excellent food for the fowls as well. Where large flocks of turkeys are available, they may be driven into the fields where the hoppers are present and they will consume large numbers of them. In using chickens, the most successful method has been to mount chicken coops on sled runners and at night, after the chickens have gone to roost, move them to the fields. After they have fed for a few days in one place, they are moved to a new location to continue their work.

This method, as in the case of the hopper dozers, undoubtedly results in the destruction of large numbers of grasshoppers. Its difficulty, as in the case of the hopper dozers, is that in spite of the large numbers that are eaten, often enough grasshoppers are left to continue destroying the crops. This method, to be successful, must be started early in the season while the hoppers are very small and before they have begun to do serious damage. If they have become so numerous that they are already severely injuring the crops, it is too late to depend upon poultry to bring them under control and poisoned bran mash should be used. If an early start can be made, this method is strongly recommended.

CONCLUSIONS

Of the various methods of controlling grasshoppers discussed in this bulletin, the use of poisoned bran mash, as described, is the most reliable. The other measures are useful in supplementing the poisoning and under certain circumstances may suffice to bring them under control. The plan of control selected should be started as soon as the grasshoppers become numerous.