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# Grasshopper Control

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**T**HE principal method of controlling grasshopper outbreaks in Minnesota is the timely and efficient application of poison bran mash. Poison bait made up of pure wheat bran and poison is known to be the most effective, but well-prepared bait made up of poison bran and sawdust is almost as effective, is considerably cheaper, and is much easier to mix and spread.

**White or crude arsenic and Paris green** are satisfactory poisons to use in grasshopper bait. Paris green is considerably more expensive than the crude or white arsenic, but it is sometimes more economical to use when only small quantities are needed.

**Sodium arsenite** is the cheapest and apparently the most effective of these poisons. It is a liquid poison which is easy to mix with water, and it is usually the most convenient to handle at general mixing stations. On farms, it is much harder to handle than Paris green or crude or white arsenic. If the mixing is done on the farms, white or crude arsenic or Paris green should be used.

**Sodium fluosilicate and sodium fluoride** have been experimented with to a certain extent and found to be promising as grasshopper poisons.

**Arsenate of lead, calcium arsenate, and sodium arsenate** are of little value and should never be used in grasshopper bait. **Epsom salts**

(magnesium sulphate), the growing of **castor bean** plants, and the use of **fly salts** (or salts containing sulphur) are not recommended for grasshopper control. Experiments indicate that these materials do not control grasshoppers satisfactorily. The growing of castor beans, which is supposed to repel the grasshoppers and to kill them when the insects feed upon them, should not be depended on. Information to date indicates that the planting of castor beans will not control grasshoppers, nor will it protect the crops against grasshoppers. There are some indications that castor beans may be dangerous to domestic animals.

### Bait Formulas

Formula No. 1 is recommended for the use of materials supplied by the federal and state governments in 1938.

#### Formula No. 1

Mill-run bran .....	100 pounds
Sawdust .....	Equal in bulk to 300 pounds or 3 sacks of bran
Sodium arsenite (4-pound material) .....	8 quarts (2 gallons)
Water .....	<u>40</u> <del>10</del> gallons

(If the sawdust is wet, reduce the water accordingly)

#### Formula No. 2

	<i>Large quantity</i>	<i>Small quantity</i>
Wheat bran (coarse and free from shorts).....	100 pounds	1 gallon
White or crude arsenic or Paris green .....	5 pounds	1 tablespoon
Molasses (blackstrap) .....	2 gallons	1 teacupful
Water .....	10 gallons	6 teacupfuls

#### Formula No. 3

Wheat bran (coarse and free from shorts).....	100 pounds
Sodium arsenite (4-pound material).....	2 quarts
Water .....	10 gallons

(Sawdust may be substituted for part of the bran.)

For mixing according to Formula No. 1, spread the three sacks of sawdust in the box. Spread one sack of mill-run bran on top of the sawdust and mix thoroughly. Then add the sodium arsenite and water with a bucket or sprinkling can.

When using sodium arsenite, follow these instructions: Obtain a 50-gallon barrel and into this barrel pour approximately 35 gallons of water. Add the 8 quarts of sodium arsenite necessary, and stir. About a third of the wet mixture should be applied and then the material should be well worked over by raking from the center into equal piles, one at each end of the box. Then spread the material out again and apply the rest of the liquid and mix again.

If a cement floor or large piece of canvas is not available to mix on, a mixing box 8 feet wide, 16 feet long, and 1 foot deep can be constructed for efficient mixing. Four hundred pounds of bran and sawdust material will measure approximately six inches deep in this box.

If crude or white arsenic or Paris green is used, as in Formula No. 2, the method of mixing is as follows:

Spread 500 pounds of the bran, or bran and sawdust, in the box. Twenty-five pounds of arsenic or Paris green, 10 gallons of molasses, and 40 gallons of water should be thoroughly mixed together in a large barrel. This mixture should be stirred continually until the last drop is emptied from the barrel onto the bran. Be sure to rinse the barrel and apply the liquid to the batch of material to be certain that the full strength of the poison is obtained. More water may be added if necessary.

If Formula No. 3 is used, wet the entire surface of the spread-out bran, or the bran and saw-

dust, by scattering the wet mixture (sodium arsenite and water) from buckets or sprinkling cans. Follow the same procedure as for No. 1.

Do not handle the pure sodium arsenite mixture with bare hands. Mix the bran and sawdust thoroughly to insure a good distribution of the sodium arsenite poison throughout the mixture.

Sawdust of any kind, with the exception of fresh sawdust from evergreens, may be used. The sawdust should be run through a quarter-inch mesh to free it from sticks, bark, etc.

Attractants such as amyl acetate, orange juice, and salt are not recommended. Molasses is recommended only when a powdered poison such as Paris green or crude or white arsenic is used.

Add only enough water to the bait to moisten it, not so much that it becomes sloppy or the flakes of bran stick together. As a rule, 10 gallons of water to 100 pounds of dry material is sufficient. Endgate seeders and homemade spreaders can be used for spreading the bait over large areas.

The rate of application should be 20 pounds of wet mash per acre per application. If properly spread, there should be only a few flakes per square foot. If the grasshoppers are not controlled, make another application in about 5 days.

Bait should be spread on the hatching grounds after most of the eggs have hatched but before the 'hoppers begin to migrate into the crops. To get the most good out of one application, delay spreading as long as possible but do not wait until dangerous migrations take place. Ordinarily 'hoppers do not leave the hatching grounds until about half-grown. It is important to poison the grasshoppers when they are in this small area rather than later after they have developed wings and are scattered over the whole farm.

## Where To Scatter the Bait

Scatter the bait wherever the grasshoppers are found. *Watch all areas where grasshoppers were plentiful last year.* If bait is applied at the proper time, it is necessary to cover only the hatching areas of the egg-infested areas. When trying to locate egg beds and young 'hoppers early in the spring, remember where most of the grasshoppers concentrated in the fall and late summer. The early 'hoppers are usually found in pastures, borders of fields, along fences, in alfalfa fields, hay meadows, weedy places, wastelands, roadsides, ditchbanks, railroad grades, and in general on strips of land 50 to 100 feet wide bordering or near fields which the previous year were in flax, corn, small grains, and other preferred crops and legumes.

## Time of Day To Scatter Bait

Grasshoppers start feeding soon after sunrise, at 5:30 or 6 o'clock, and continue until 10 or 11 o'clock in the morning. They do not feed a great deal when the temperature is below 68° F. or above 85° F. The best time to spread the bait, then, is when the feeding is at its height. The best results are obtained when the bait is fresh and moist.

Grasshoppers do not die until 6 to 48 hours after eating the poison. Sometimes they are hard to find after they die of poisoning. In estimating the kill, the area must be examined very carefully.

## Danger of Poisoning

Always mark the bags of bait with the word "POISON." Never leave quantities of bait where it is accessible to children or animals of any kind. *Arsenic is a deadly poison.* If the bait is scattered

in flakes at the rate of 20 pounds per acre, there is no danger to livestock or birds. If it is allowed to fall in lumps, serious results may follow. Arsenic containers, left-over bait containers, and other similar materials should be burned and the ashes spread very thinly over a large area of ground or buried deeply. Arsenic dust is poisonous to the lungs if inhaled continuously, and it also irritates the skin if allowed to remain for a long time. Greasing the hands before handling the bait is a good practice.

Following the 1932 control campaign in Minnesota, when bait was used over approximately 5 million acres, the following question was asked farmers and county agents in this area: "Was livestock poisoning due to carelessness, improper application, or handling?" Every one of the 55 counties involved reported that any livestock poisoning was due to carelessness.

Extensive experiments have been carried on in studying the effect of these poisons on livestock, poultry, birds, and wild animals. These experiments have furnished conclusive evidence that grasshopper bait if properly spread is not a menace to livestock, poultry, song and game birds, and wild animals.

Burning does not destroy grasshopper eggs, as the eggs are deposited too deep to be affected by the heat from the average grass fire.

For detailed information on grasshoppers and their control, biology, and habits, see Special Bulletin 194 of the Extension Division, University Farm, St. Paul.

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