BOISE, FEBRUARY, 1931 EXTENSION BULLETIN NO. 80

UNIVERSITY OF IDAHO
COLLEGE OF AGRICULTURE
EXTENSION DIVISION

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How To Control Grasshoppers

COÖPERATIVE EXTENSION SERVICE IN AGRICULTURE AND HOME ECONOMICS OF THE STATE OF IDAHO UNIVERSITY OF IDAHO EXTENSION DIVISION AND UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING

ENTOMOLOGY SECTION

Printed and distributed in furtherance of the purposes of the Cooperative Agricultural Extension Service provided for in Act of Congress May 8, 1914.

Grasshoppers will become very abundant in many parts of Idaho if favorable conditions continue. They are capable of destroying many kinds of crops. Crop destruction means the loss of many dollars. This loss can be prevented. Poisoned bran mash will control grasshoppers if it is prepared and applied as recommended in this bulletin.

How To Control Grasshoppers*

By
W. E. SHULL

The grasshopper population has increased in Idaho in the last three years. With favorable conditions it will continue to increase to a point where the insects are capable of doing very serious damage.

Grasshoppers attack many kinds of crops among which are alfalfa, clover, grains, beans, beets, potatoes, and fruits. When the insects are numerous they are able to destroy such crops entirely, or to very seriously reduce the yields. They very often cause severe damage in alfalfa and clover seed-growing districts by cutting off the stems of the blossoms and immature seeds. Besides attacking the seed of these two crops they feed heavily upon the foliage, thus reducing the tonnage of hay. They may strip the foliage from the plants in grain fields or destroy the grain by cutting off the heads. Orchards may be completely defoliated by hordes of migrating grasshoppers feeding upon the leaves, and the trees thus may be greatly weakened. Grasshoppers also attack and eat the green parts of plants such as potatoes, beans, tomatoes, and many others.

Egg Laying Habits

Adult female grasshoppers begin laying their eggs during the latter part of July and continue into the fall. They may lay many eggs on a warm, bright, dry day and if favorable weather conditions continue for several weeks it is possible for them to deposit enough eggs in a single season to greatly increase their population the following year.

Where To Find The Eggs

Grasshopper eggs are deposited from one-half inch to three inches deep. They are usually placed in the more compact soil along ditch banks, roadways, fence rows; around straw and hay stacks, and edges of half-buried stones. They are seldom found in loose soil except when grasshoppers are migrating in large numbers. Grasshoppers like sunshine and therefore their

* This bulletin is a revision of Extension Bulletin Number 61, University of Idaho, with the addition of more recent information. The writer wishes to acknowledge the work of Dr. J. R. Parker, Senior Entomologist, Bureau of Entomology, United States Department of Agriculture, and of R. L. Shotwell, Assistant Entomologist, Bureau of Entomology, United States Department of Agriculture, whose publications have been drawn upon freely in the preparation of this bulletin.

eggs are deposited upon the crests or southern slopes of slightly elevated areas which are exposed to the sunshine. Some of them select light sandy soils while others prefer heavier soils. The eggs are about one-fifth of an inch long, curved, tapered toward each end, and vary from cream to brown in color. They are deposited in clusters each containing from 15 to 50 eggs. Egg beds may be located by digging in the upper three inches of the soil with a knife or trowel. When eggs are found in large numbers this fact should be reported to the county agent. The breeding grounds should be located in the fall and the egg beds carefully watched the next spring for the appearance of the newly hatched grasshoppers.

When To Look For Young Grasshoppers

Young grasshoppers begin emerging from the soil as early as April and eggs continue to hatch for a period of six or eight weeks, depending upon the species and climatic conditions. They begin to feed soon after they emerge and grow very rapidly so that they become adults in July or before. They feed in bands very close to the egg beds for several days after emerging, then separate and spread into the surrounding fields where they feed upon green foliage. Very often, if cold, wet weather follows for several successive days, many of them are killed by disease. If, however it is warm and dry most of them continue to develop and reach maturity. Weather conditions greatly influence populations but cannot be depended upon to control the grasshoppers.

How To Control Grasshoppers

The most successful means of controlling grasshoppers is by the use of poisoned bran mash bait which must be applied at the right time to obtain the best results. Many grasshoppers may be killed before they hatch if the egg beds are plowed, disked or spring-toothed in the fall or very early in the spring. Cultivation of the egg beds may be economically employed when it fits in with the best farm practices in a particular locality, but it is not generally recommended.

Poisoned bran mash is prepared according to either of the two following formulae:

Formula One

Coarse bran (free from shorts)	100 pounds	10 pounds
Liquid sodium arsenite (eight-pound material	One quart	24 teaspoonfuls
Water	10 to 12 gallons	1 gallon
Molasses	Two gallons	1½ pints
Amyl acetate (technical)	3 ounces	2 teaspoonfuls

Formula Two

Coarse Bran (free from shorts)	100 pounds	10 pounds
White arsenic or Paris green	5 pounds	8 ounces
Water	10 to 12 gallons	1 gallon
Molasses	Two gallons	1½ pints
Amyl acetate (technical)	3 ounces	2 teaspoonfuls

One hundred pounds of bait will poison twelve or fifteen acres.

Bran: Bran is used as a carrier for the poison. The bran used in this bait must be coarse and must be free from shorts. Shorts cause the flakes of bran to stick together and form lumps which are very undesirable in bran mash bait.

Poison: Formula One is to be preferred because the liquid sodium arsenite is much more easily mixed into the bait and is less irritating to persons preparing the bait than the dry powdered form of poison. The amount of poison used costs only about one-fourth as much as that in Formula Two. Formula One requires eight-pound liquid sodium arsenite (eight pounds of arsenic in each gallon of liquid). If eight-pound material cannot be obtained use four-pound material but use two quarts of the poison for each 100 pounds of bran. If sodium arsenite is not obtainable, white or crude arsenic or Paris green may be substituted as in Formula Two.

Molasses: The molasses makes the bait more attractive to the grasshoppers and aids in retaining the moisture for a longer period of time. The molasses used in this bait may be obtained from sugar refining companies and is the cheapest kind obtainable. It should be bought in 50 or 100 gallon drums.

Amyl Acetate: Amyl acetate is used to attract the

grasshoppers. It has a sweet, banana-like odor. Do not use more than the amount called for in the formula. The technical grade is recommended. If amyl acetate is not available, oranges and lemons may be added at the rate of 24 fruits for 100 pounds of bran. Fruits are very much more expensive than amyl acetate and should not be used unless the acetate is not available.

Water: Only enough water should be used to moisten the bran and not enough to make a sticky mixture. *Do not use an excess of water.*

How To Mix The Bait

The bait may be mixed on a cement or wooden floor, in a tight wagon box, on a canvas, or in a tank. The bran should be spread out thinly and the liquid added very slowly while the whole mass is being mixed. The mixing should be done very thoroughly. If Formula One is used the molasses, sodium arsenite, and amyl acetate are mixed thoroughly with part of the water, then the liquid mixture, and finally the remainder of the water, are added slowly to the bran as it is being mixed with a shovel or hoe. After the necessary water has been added, reshovel the bait until it is very uniformly mixed. The bran mash should be just moist enough so that when pressed in the hand it will not form a lump and when broadcast will break up into flakes. If Formula Two is used the powdered white arsenic or Paris green is first thoroughly mixed with the dry bran. The amyl acetate and molasses are again mixed with the water and the same procedure is followed as for Formula One.

How To Scatter The Bait

Grasshoppers begin to feed readily when the temperature reaches 65° F., and continue until it reaches 80° F. When the temperature goes above 80° F. they crawl up on a plant to escape the heat and do not feed on bran mash bait which is on the ground. This is a very important point to know in the control of these insects. Grasshoppers feed only for short periods at any given time. The bait should be scattered just long enough before the first feeding period so that it will not have had time to dry out before the grasshoppers feed, but it should be there before the first feeding period does begin. Their feeding time will be approximately between eight and eleven o'clock in the morn-

ing. The bait should be broadcast while the small grasshoppers are still in bands close to their breeding grounds and before they have scattered into the surrounding fields. They can be poisoned after they have spread over larger areas but at a much greater cost. The mash it usually broadcast by hand. It should be thrown with a snap of the wrist so that it will completely separate into flakes. Lumpy mash should not be scattered in the fields because it is dangerous to livestock, and the grasshoppers do not feed readily upon it. When a whole field is to be treated the poison may be scattered in strips one or two rods wide and at intervals of one or two rods, thus reducing the cost. When poisoning is done in hay fields at cutting time a strip a few yards wide may be left uncut in the middle of the field. After three or four days the grasshoppers will have congregated in this strip and may be poisoned there with less bait. If nymphs are migrating from adjacent fields, scatter the mash in a strip a couple of rods wide across the path of migration.

How To Judge Results

The poison used in this bait is slow in action and it may take several days before the grasshoppers are killed; however, after they have once fed they become sick and do not cause further injury. Poison bait may be relied upon to kill most of the grasshoppers in a field at any one time but it may be necessary to poison several times when attempting to stop a migating band or when hatching continues over a long period of time. To do efficient work when the grasshoppers are hatching in large numbers it is necessary that whole communities be organized and that everyone coöperate in spreading the mash and in paying for the cost of the operation.

Danger To Animals

There is no danger to livestock or poultry from eating the poisoned mash, if the bait is properly scattered; that is, scattered so that it will not be found in lumps, but rather in individual flakes. All left-over materials both mixed and unmixed should be so disposed of that children or livestock cannot get to them. The poisons used in these baits are toxic to human beings if taken inwardly.