12-1937

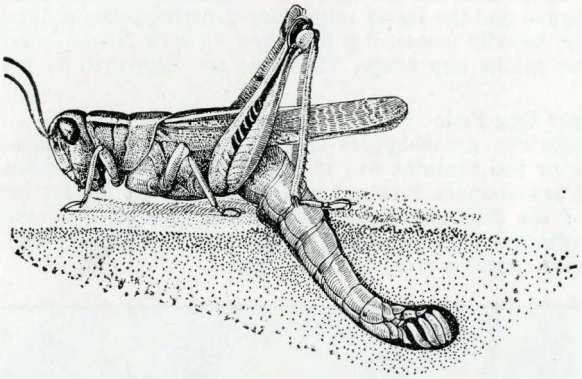
Destroy Grasshopper Eggs

George I. Gilbertson

H. C. Severin

Extension Circular 371 December 1937

Destroy Grasshopper Eggs



Two-striped grasshopper laying eggs. After Walton.

by
George I. Gilbertson
Extension Entomologist
and
H. C. Severin
Head, Entomology Department
Extension Service
South Dakota State College Brookings, S. D.

Destroy Grasshopper Eggs!

Grasshopper infestations of more or less serious proportions have been experienced in South Dakota during the past 10 years. Each fall many questions have been asked the writers concerning the deposit of eggs that was made by the grasshoppers during the growing season just closed and information was sought concerning measures which, if followed, might be effective in destroying the hopper eggs.

There are about 112 different species and varieties of grasshoppers in South Dakota. Ordinarily, only four of this number affect our cultivated crops to a damaging extent. These four species are the two-striped, the differential, the red-legged, and the lesser migratory grasshoppers. The two-striped and the differential grasshoppers are robust of body and usually measure between one and one and three-fourths inches in length. The red-legged and the lesser migratory grasshoppers, on the other hand, are smaller, usually measuring less than an inch. These hoppers all live over winter in the egg stage. The eggs are deposited in masses called egg pods.

Grasshopper Egg Pods

Our injurious grasshoppers deposit their eggs in masses or pods. Each mass or pod contains five to 100 eggs or more, depending upon the species of grasshopper involved and other factors. As an average, each egg pod of the differential and two-striped grasshopper contains about 90 eggs; whereas, each egg mass of the lesser migratory and red-legged grasshoppers contains from 20 to 25 eggs.

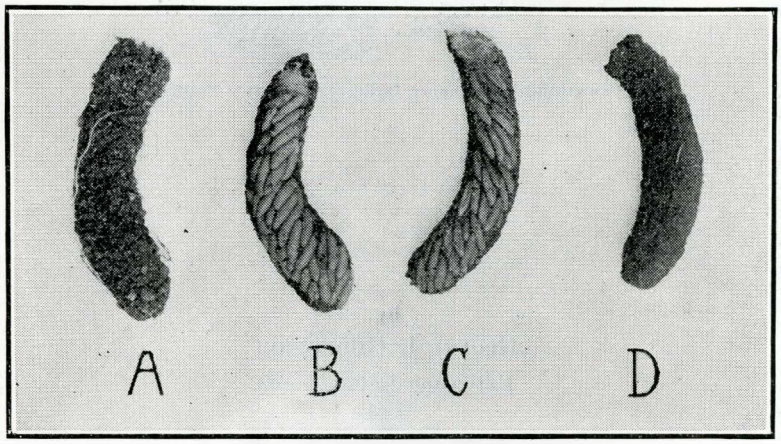


Fig. 1—Egg Pods of Two-Striped Grasshopper
A, D—egg pods intact. B, C—egg pods with portion of covering removed to show arrangement of eggs.

The egg pods, when carefully dug out of the soil, are ordinarily cylindrical in shape and slightly curved. The outside surface of the pod is covered with particles of soil, rootlets, sand grains, etc. (Fig. 1)

How Eggs Are Laid

A grasshopper about to lay eggs, first makes a hole in the ground or among the stems or roots of plants, with her abdomen. For this purpose, the end of her body is provided with four curved, horny pointed structures, the ovipositor. The hole is made by pressing the tips of these processes against the ground and then alternately opening and closing the ovipositor. The abdomen is worked in this manner gradually downward and backward into the ground or among the stems or roots of plants (cover). When the abdomen has been forced into the ground as far as it will go, it is greatly elongated. A frothy liquid is now poured into the hole and into this fluid the eggs are placed, one at a time. The abdomen is gradually withdrawn from the hole as more and more liquid and eggs are added, and finally, after egg-laying has been completed, a mass of frothy material is secreted which is molded by the ovipositor as a plug to the hole and a cap to the egg pod. The dried liquid not only binds the eggs together but forms the envelope around the mass of eggs.

When Eggs Are Laid

The time of year when grasshoppers lay their eggs will vary with the species of grasshopper and the prevailing weather. Ordinarily, the differential and two-striped grasshoppers deposit their eggs during the latter part of July and during August and September. The lesser migratory grasshopper, however, matures earlier than do the two species just mentioned, and may begin egg laying as early as the latter part of June. Further, the lesser migratory grasshopper is capable of producing a partial second generation of 'hoppers. This took place in South Dakota during the year 1937. Many of these second generation hoppers matured and laid eggs before cold weather set in and destroyed them.

Where Eggs Are Laid

Ordinarily, every species of grasshopper has a preferred type of environment in which it chooses to lay its eggs. These environments are not necessarily the same for different species of grasshoppers. The eggs of the differential and two-striped grasshopper are usually deposited in grassy fence rows, grassy field margins, and grassy head lands. They may also be laid in quantity in grass growing in alfalfa fields, in the crown of the alfalfa plants, and among the roots of weeds growing around bare areas in alfalfa fields. Some weedy areas in fields may also attract these grasshoppers for egg laying purposes. (Figs. 2 and 3).

On the other hand, the lesser migratory grasshopper which was the predominant injurious form in South Dakota in 1937 prefers to scatter its eggs throughout fields of standing grain or flax or in fresh stubble of such crops. Uncultivated fields covered with Russian thistle and other plant growth are also chosen by this form for egg laying. At times, these hoppers lay their eggs in weedy field margins, grassy strips, edges of corn fields, etc.

How Eggs Can Be Located

Every farmer should make an examination of his lands for grasshopper eggs in the locations mentioned in the preceding paragraphs. A small sharp spade or garden trowel may be used to advantage in this

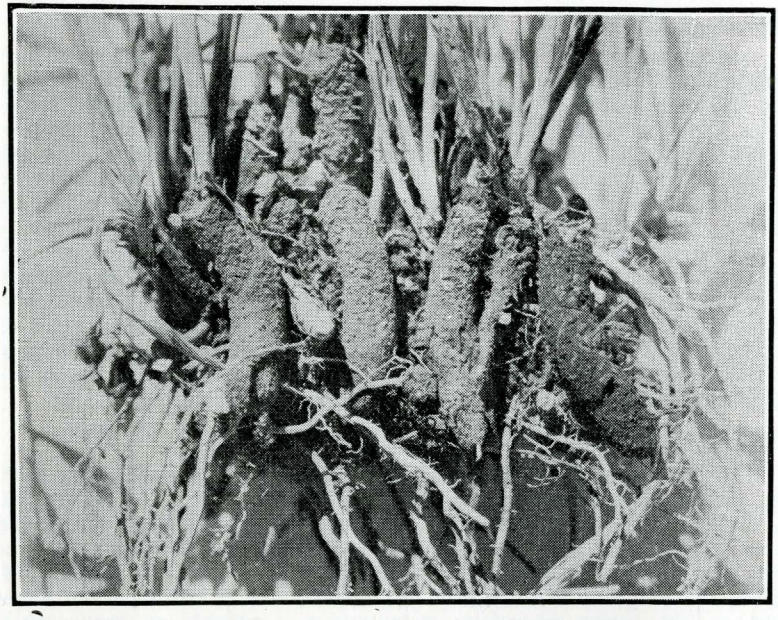


Fig. 2—Grasshopper Eggs in Grass Roots

operation. Grass clumps and the roots of other plants in places suitable for egg laying should be dug up and pulled apart. If egg pods are present, they should be revealed. The soil around the crowns of alfalfa plants should be carefully removed in order to expose any eggs that may be present. Screening small areas of stubble soil through a one-fourth inch gravel screen will yield up hopper egg pods if they are present. At times, the soil under wisps of straw left around shock bottoms will show a heavy concentration of egg masses of the lesser migratory grasshopper.

When Do Hopper Eggs Hatch?

Normally, the eggs of our injurious grasshoppers hatch during the latter half of May and early June. The hatching time is dependent upon many factors such as weather, type and color of soil, slope of land, whether or not soil is shaded, moisture in soil, time when eggs were laid, etc. In 1937 in certain areas, eggs hatched out in late April and in other areas not until late in May. Ordinarily, grasshopper eggs do not hatch at the same time, but the hatching period very often extends over several weeks.

Does Freezing Kill Grasshopper Eggs?

Field and laboratory tests have shown that grasshopper eggs are very resistant to freezing when they are covered with a small amount of soil and even snow. Under such conditions the hopper egg pods are not injured by the lowest temperatures recorded in South Dakota.

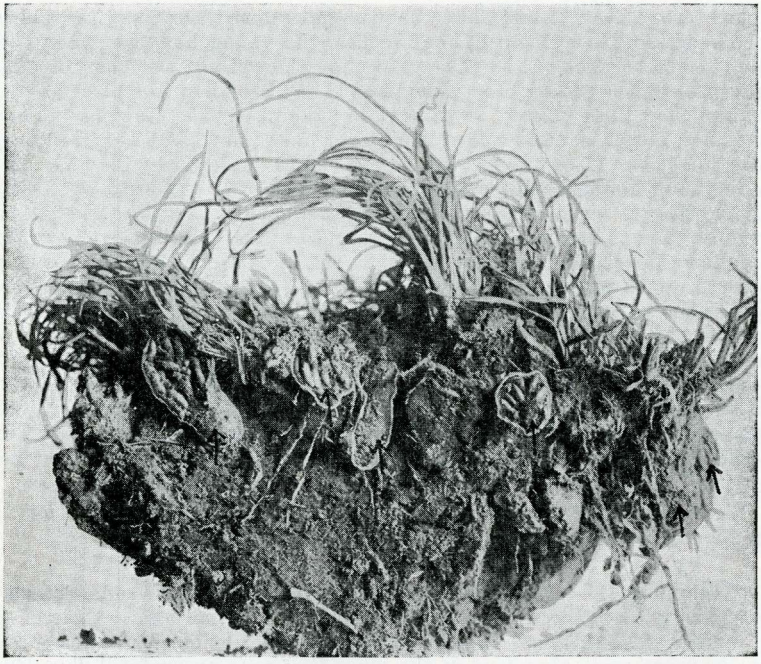


Fig. 3—Clump of gama grass showing grasshopper egg pods among the stems and roots. (After Severin and Gilbertson.)

Does Burning Kill Grasshopper Eggs?

This question is often asked. Field trials and observations have shown that the heat of burning vegetation does not penetrate deep enough into the soil to destroy grasshopper eggs.

What Weather Conditions Destroy Grasshoppers?

Cold rainy periods of several days duration occurring just after a big hatch of grasshoppers will frequently destroy large numbers. The young hoppers are not active during periods of low temperatures. When the temperature is below 55 degrees F. immediately after hatching the 'hoppers are inactive and if this temperature prevails for a week a high mortality results. At times, heavy driving rains dash the tiny hoppers into the mud and wash them into streams, further increasing the mortality of the insects. However, it must be remembered that the hatching period extends over several weeks and the unhatchd eggs will not be injured by such cool rainy weather. Weather conditions unfavo able to young grasshoppers do not occur often enough to count upon as a reliable control factor.

How Can Grasshopper Eggs Be Destroyed?

Stubble Fields.—The lesser migratory grasshopper prefers to scatter its eggs throughout fields of growing grain or flax or in the fresh stubble

of such crops. Actual tests have shown that when these eggs are buried in compact soil to a depth of four inches, the young hoppers, when they hatch, cannot penetrate to the surface of the soil. It becomes obvious, therefore, that a good job of plowing to a depth of five to six inches will accomplish a high degree of control in stubble fields. Plowing may be done with either a mold board plow or a disk plow, but the former is more effective. If, however, the furrow slice is left standing on end, many young hoppers will escape to the surface of the ground. As a rule, fall plowing is more effective than spring plowing. We realize that because of various reasons fall plowing is not always a good farm practice to follow in certain areas or during certain seasons. Spring plowing, however, gives very good results in egg control providing that the plowing is done before May 1. By this time, ordinarily, very few eggs have hatched and spring plowing therefore may accomplish a great deal so far as grasshopper control is concerned. A very determined effort should be made to plow up to and including fence lines regardless of whether fall or spring plowing is done. Many fields show a soddy or grassy field margin of a rod or more which is an ideal place for egg laying. This should be plowed up to reduce the grasshopper population on field borders.

We further realize that in some localities annual plowing is not recommended because of wind erosion, water conservation, etc.

"Stubbling In"—Again, because of economic and seasonal reasons (late spring, drought, etc.) a large number of farmers seed their crops by merely drilling them into previous years stubble. In areas where grasshoppers were abundant in the preceding year or are still abundant, this is a costly venture. In past years, grasshoppers hatched throughout such fields and in many instances, by the time the damage was noticed and poison applied, the crop was lost. We advise that if crops are to be stubbled in, the last year's stubble should be worked as much as possible, consistent with the best agricultural practices of the area. While not as effective as plowing, repeated disking and harrowing mechanically destroy a number of eggs and brings others to the surface where they dry out. Complete control cannot be secured by this operation and should only be resorted to where plowing is not practical. It must be borne in mind that shallow tillage such as is accomplished through disking or through a "duck foot" cultivator, etc., is not very effective through a single operation but must be repeated several times to accomplish the best results.

Alfalfa fields ordinarily are left untilled from year to year and in many instances prove to be the breeding ground of hoppers for surrounding crop lands. We have a number of farmers in this state who have made it a practice of going over their alfalfa fields with a spring tooth harrow. Since it is a matter of observation that the grasshopper populations are greatly reduced in the alfalfa fields by such treatment, it seems desirable that such a program be followed. No doubt some injury will be noted from the action of the harrow, but usually the spring-tooth has enough flexibility and side slip to avoid tearing apart very many crowns.

Field Margins and Fence Rows

Plowing or other tillage methods should include field margins and fence rows. Since it is known that the two-striped and differential grasshoppers

tend to concentrate their egg deposits in these places, thorough treatment of these strips will help materially in reducing grasshopper outbreaks.

Roadsides, etc.

Each roadside, if it is infested with grasshopper eggs, presents its own problem. Some roadsides are amenable to tillage method, others are not. If, however, a given roadside is heavily infested with eggs, every effort should be made to destroy them through cultural or mechanical means.

Field Grass Areas (Potholes)

In a great many fields this year, low grassy and weedy areas within stubble fields proved to be heavily infested with grasshopper eggs. These places should receive careful attention this fall because in the spring they are usually too wet to till and are, therefore, allowed to remain undisturbed.

Can South Dakota Farmers Expect to Control Grasshoppers Through Tillage Methods Alone?

No. In many areas of our state, in order to keep the soil from blowing and to conserve as much water as possible, tillage is reduced to a minimum. Since this is the case, complete grasshopper egg destruction cannot be expected in these areas. However, "stubbling in," if carried on, should be done with the maximum amount of tillage that a given soil will stand. These tillage operations will destroy at least some of the hopper eggs and will help materially in reducing hopper population.

What Factors Should Be Considered in Dealing With Grasshoppers?

The following list of factors should be common knowledge in grasshopper infested areas. **No single one** of these factors can bring about the control of grasshoppers but an intelligent observance of them all will reduce the hazards of farm operations in grasshopper years.

I. Cultural Control

Fall plowing where advisable.
Spring plowing if done by May 1.
Listing, a thorough job.
Duck Footing.
Disking and harrowing.
These operations are listed in the order of their efficiency.
Early seeding usually advisable.
Early crops very often escape severe damage.

II. Crop Susceptibility

Barley
Rye
Flax
Oats
Spring Wheat
Winter Wheat

These crops are arranged in the order of grasshopper preference.

Corn—Dent preferred over Flint.

Forage

Alfalfa
Sweet clover
Millet
Sudan grass

These are arranged in order of grasshopper preference.

III. More or Less Immune Crops

Sorghums
Grain
Amber

With this observation that after the plants are 10 inches high they are not a preferred food of the grasshopper.

IV. Poison Operations—Started on time and followed through. When all of the above factors have been considered and put into operation, each farm operator has done a great deal in reducing the number of hoppers on his own farm.

Do Your Part in a Cooperative Program.

A familiar complaint in the state is that several farm operators will engage in control work while adjacent operators will not. When the hoppers, therefore, have destroyed the crops on the untreated areas, they migrate to the succulent treated crops and control efforts are thereby nullified. Therefore, acquaint all operators with details of grasshopper control. Be sure your community is adequately organized to control grasshoppers before extensive damage is done. Make arrangements to have bait available where and when needed.

Make grasshopper control a truly cooperative effort!

Extension Service
South Dakota State College of Agriculture and Mechanic Arts
Brookings, South Dakota

Published and distributed under Acts of Congress, May 8 and June 30, 1914, by the Agricultural Extension Service of the South Dakota State College of Agriculture and Mechanic Arts, Brookings, A. M. Eberle, director, U. S. Department of Agriculture cooperating.