

BOISE, MARCH, 1921

EXTENSION BULLETIN NO. 52

UNIVERSITY OF IDAHO

EXTENSION DIVISION

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THE GRASSHOPPER PEST

How To Overcome It By
Co-operative Campaigns

COOPERATIVE EXTENSION SERVICE IN AGRICULTURE
AND HOME ECONOMICS OF THE STATE OF IDAHO
UNIVERSITY OF IDAHO EXTENSION
DIVISION AND U. S. DEPARTMENT
OF AGRICULTURE COOPERATING

ENTOMOLOGICAL SECTION

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

Co-operate to Kill the Hopper

THIS BULLETIN is the outgrowth of experiences of the extension entomologists, in cooperation with county farm bureaus of Idaho, in conducting county and community campaigns for destruction of grasshoppers. Acknowledgment is made to county agricultural agents, not only for subject matter concerning the grasshoppers themselves, but especially for information and aid in describing methods of organization and cooperation for combating the pest. This bulletin is issued as a guide to counties and communities planning in future to initiate anti-grasshopper campaigns.

The year 1918 was the beginning of recent grasshopper outbreaks in Idaho. That year great damage was done with little effort to control the pest. In 1919 the worst outbreaks occurred in Adams, Camas, Idaho, Lemhi, Lewis, and Valley counties; serious damage was done and hundreds of acres of crops were completely ruined. Lewis county poisoned so effectively that very few grasshoppers appeared the following spring.

In 1920 a concentrated campaign was made by the different counties in conjunction with the Farm Bureaus and the University Extension Division. Fifteen counties were troubled with the pest. Four counties put on such an effective campaign as to remove expectation of trouble there the following year. These counties were Idaho, Lemhi, Valley and Camas. The remaining eleven counties had large numbers of grasshoppers in different localities doing more or less damage. These were Adams, Ada, Blaine, Bannock, Cassia, Elmore, Franklin, Kootenai, Lewis, Power and Washington.

THE GRASSHOPPER PEST

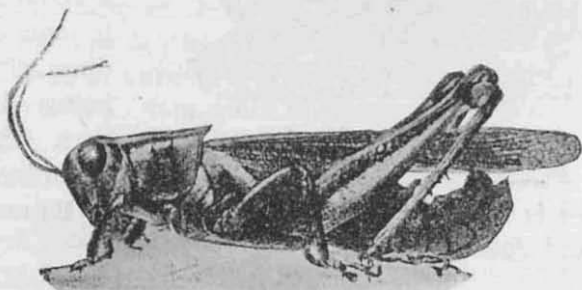
By VICTOR JONES
Assistant Extension Entomologist

IS THIS PEST the grasshopper that caused so much damage in the Middle West years ago," is usually the first question asked by Idaho farmers when a new grasshopper outbreak occurs.

It is not. The Rocky Mountain Locust (*Melanoplus spretus*), which was the worst pest in the seventies, is a migratory species, hatching on the plains along the eastern base of the Rocky Mountains, as the name denotes, where the species is always found in greater or less abundance. It was accustomed to migrate to the Dakotas, Kansas, and neighboring states, where it lived and reproduced for a few years and eventually disappeared. It has done no serious damage in recent years due to the fact that a great portion of the original breeding grounds is now in cultivation. No future trouble is expected from it. An outbreak is possible, but not probable.

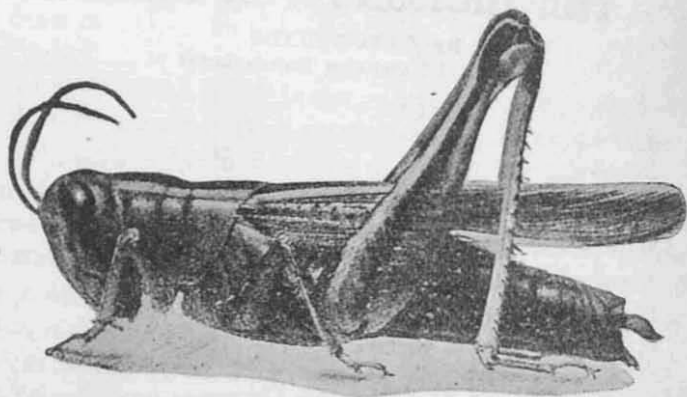
SPECIES DOING INJURY IN IDAHO

TWO-STRIPED GRASSHOPPER (*Melanoplus bivittatus*): This is one of the largest species, the female being an inch and a half long. The insect is usually of a dull brown or drab color, with a conspicuous yellow stripe along each side of the back running from the head nearly to the tips of the wings. These stripes are very noticeable,

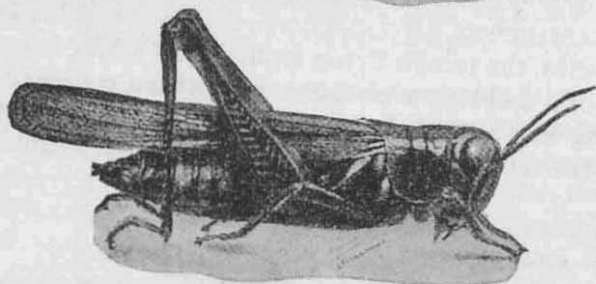
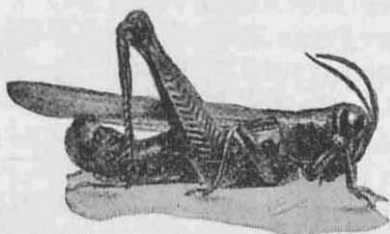


Two-striped grasshopper (*Melanoplus bivittatus*), adult male.
Twice natural size. Figure 1-A.

as a rule, and distinguish this species, when at rest, from the other forms. This species is found in the following counties: Adams, Ada, Camas, Idaho, Valley and Lemhi.



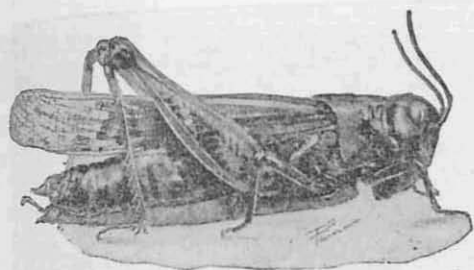
Two-striped grasshopper (*Melanoplus bivittatus*), adult female. Twice natural size. Figure 1-B.



Red-legged grasshopper (*Melanoplus femur-rubrum*) above, adult male; below, adult female. About twice natural size. Figure 2.

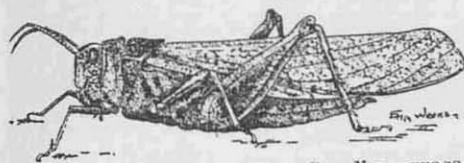
This species is found in Ada, Benewah, Blaine, Bannock, Cassia, Franklin and Power counties.

RED-LEGGED GRASSHOPPER (*Melanoplus femur-rubrum*): General color, reddish-brown above, dull greenish-yellow beneath, without distinct bars on hind legs. Its legs are of a reddish color. It is one of the medium sized species, being little more than three-fourths of an inch in length.



Clear-winged grasshopper, adult female, about twice natural size. Figure 3.

Clear-winged grasshopper, adult female, about twice natural size. Figure 3. The outer wings are brownish with dark colored spots and the hind wings are transparent. Most of the damage in Idaho, Kootenai, Valley, Washington, Adams, Elmore, Camas and Lemhi counties was done by this species.



The black-winged locust, or Carolina grasshopper. Figure 4.

The black-winged locust, or Carolina grasshopper. Figure 4. It is thus rendered inconspicuous while sitting upon the ground. Its hind wings are nearly black, but are margined with yellow. It did great damage to the alfalfa seed in Bannock and Ada counties.

CLEAR-WINGED LOCUST (*Camnula pellucida*):

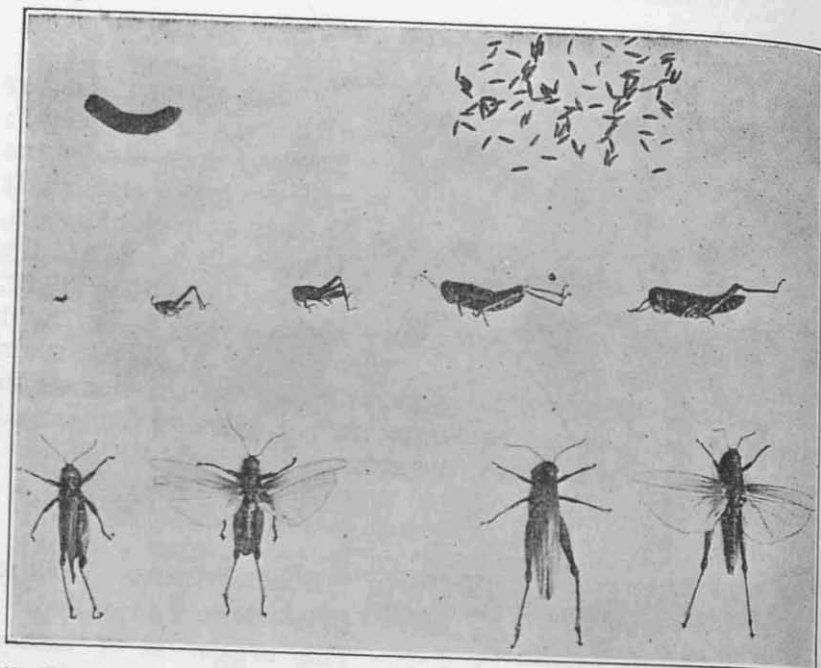
This is known also as the yellow-wing or pellucid. It is about an inch in length. It generally frequents dry soil and is swift in flight. General color is light

BLACK-WINGED LOCUST (*Dissosteira carolina*):

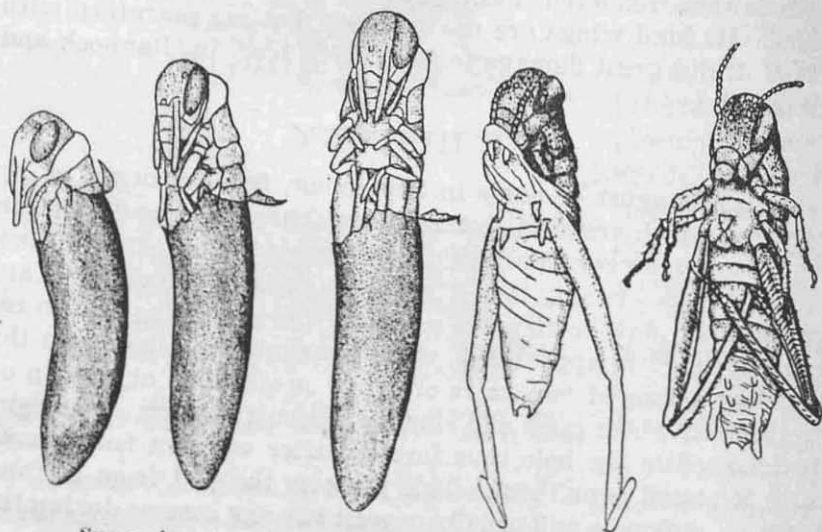
This species is of rather large size, and is usually of a plain pepper-and-salt color.

LIFE HISTORY

Late in August or early in September, females begin to lay their eggs, which are reddish-brown in color, about one-fifth of an inch in length, longer than thick, and tapering at the ends. They are laid in pods—twenty to thirty in each pod. When the pods are broken by the plow or disk, the scattered eggs might be said to resemble rye seed in appearance. The female bores a hole into the ground by means of two pairs of horny projections at the tip of her abdomen which open and shut by muscular action. The eggs are deposited in the hole thus formed, after which a frothy substance is placed over them. This protects the pod from air and moisture. A female will usually deposit two egg masses during the season.



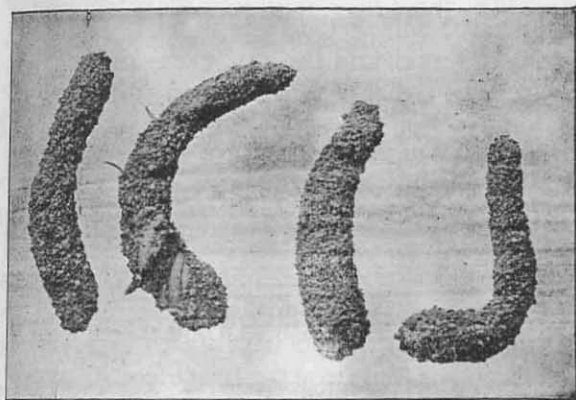
Life history of grasshopper. At left, above: Egg pod. t right, above: Eggs taken from one egg mass. Center row: Stages of immature grasshoppers. Below, at left: Male grasshoppers. Below, at right: Female grasshoppers. Figure 5.



Successive stages in the hatching of a grasshopper. Figure 6.

The winter is passed in the egg stage. During the last of May or early in June, the young grasshoppers begin to hatch. The

newly hatched nymphs are cream colored, changing to a dark color in a few hours. They are able to hop in a few minutes after emerging from the egg shell. If hatched where vegetation is scarce they begin searching for food in a few days. They move by hopping. If it happens to be windy, they travel much faster by jumping into the air, being carried by the wind, eventually finding themselves in a field of spring grain or other fields where food is equally palatable. In sixty or seventy days they are mature grasshoppers, having molted (shed their skin) five times. After each molt their wings are longer, the wings being fully grown after the fifth molt.



An ideal egg bed is high and dry pasture land, the ground being not too hard, with abundant pasture grass in the crowns of which the eggs are usually laid. At other times the eggs are laid in the crowns of alfalfa plants, in summer fallow, stubble

fields, remains of old strawstacks, sagebrush, and rocky canyons where the sun strikes the strongest. In these canyons the eggs usually hatch earliest in the spring.

HABITS OF THE NYMPH

In inclement weather the nymphs do not feed, but remain hidden in some convenient shelter. Turning over rocks and clods one may find several of them cuddled together. On sunny days they gather in open spots, feeding and moving about. Just before the sun sets, any stones or boards in the fields will be a swarming mass of young nymphs, which are attracted to these warmer objects. At night they disappear, hiding away in the grass, under clods, or stones, or in cracks in the earth. During the late nymphal stage and molting periods they crawl up grass stalks, fence posts, trees and stumps. Their instinct seems to be to climb. This undoubtedly protects them to some extent from fungous disease and other

parasites. In late afternoon when clouds are thick few grasshoppers can be found where in the morning millions of them may have been noticed.

HABITS OF THE ADULTS

Most of the feeding is done during the warmest part of the day. The higher the temperature, the more active the adults become. In wet weather their habits are similar to those of the nymphs. The adults of the *Camnula pellucida* are strong fliers, sometimes covering a distance of a hundred feet before lighting. At other times, hundreds of them may be seen three or four feet above the ground dropping down a few inches now and then or rising again, making the usual noise with their wings. When they happen to be between the observer and the sun, thousands of them may be seen in the air at once.

CONDITIONS FAVORABLE TO GRASSHOPPER INCREASE

In the mountains and valleys near the scene of all serious grasshopper outbreaks, one can always find grasshoppers in abundance. People are so accustomed to seeing them flying around the roads and fields, that very little attention is given to them simply because they have not damaged the crops. There comes a time, however, when seasonal conditions are favorable, grasshoppers multiply rapidly, and attack young crops by the millions. A late, warm, dry fall makes it possible for the females to lay the maximum number of eggs. Then, a winter with plenty of snow or continuous freezing tends to give maximum protection to the egg pods. A late spring, following such a winter, retards the hatching of the eggs so the young nymphs are not forced to fight against rain and snow in their struggle for existence, as is the case when they emerge before the rainy season begins. Continuous warm, dry weather then is favorable for the young grasshoppers to live.

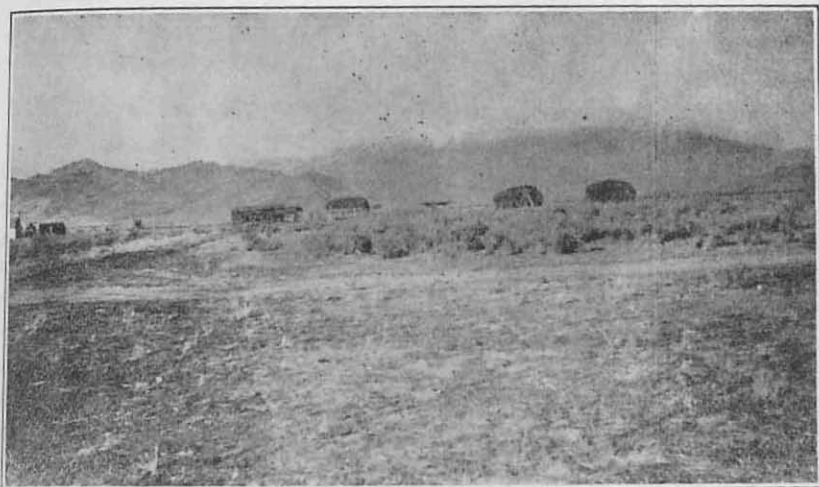
When native vegetation is abundant and green, grasshoppers do little or no injury to cultivated crops, but when grass and green shrubbery upon the hills becomes dry and before the time the grasshoppers are mature, their food supply has vanished, so down into the valley lands they make their way by millions in search of food. The only green vegetation left is likely to be the spring grains and gardens, and on these they feed until they reach maturity and are ready to reproduce, at which time they will make

their way to the hills where they breed and deposit their eggs for the following year.

The last three years have been favorable for the grasshoppers in Idaho. They swarmed from the hills and mountains into the valleys, where they proceeded to do damage unchecked and increased for at least a year, and for three years in some localities.

LOCATION OF EGG BEDS

By ordinary observation most of the egg beds can easily be located. Thousands of grasshoppers will be seen congregating in a single locality in the fall of the year. They will be crawling about rather than hopping or flying. Observing a little closer, from seven to ten will usually be found together. They will not fly as one approaches. The female is making the hole in which to lay her eggs.



Where eggs were found by thousands. Figure 8.

The remaining hoppers, which are males, crowd about. If there is a large number of grasshoppers flying and none have been observed laying their eggs, one may locate the eggs by digging up the soil to a depth of two inches and carefully breaking up the lumps of dirt. Invariably egg clusters will be found where grasshoppers have been observed to be numerous. Covering the whole field or locality in this manner one may obtain a very good idea of the extent of the beds. If an average of one to seven pods is found on each square foot of ground, an outbreak may follow the next year. If eggs cannot be found, there is no surety that no eggs have been laid, for they may have been deposited in neighboring fields.

DESTRUCTION OF EGG BEDS

If the egg-infested land requires plowing for the next crop, no other treatment need be given. The plowing should be at least six inches deep, and should be finished before the first of April, but preferably before the winter sets in. This covers the eggs so deeply that the majority of the young cannot crawl out when they hatch. If plowing is unnecessary for the following crop, the eggs can be destroyed with little expense by stirring the ground to a depth of two inches, crosswise and lengthwise. This breaks and crushes many capsules and exposes others to attacks of enemies and disease, as well as to drying and freezing. Stirring can be best accomplished by disking. In case it is impossible to tear up the beds, the location should be marked in order that the young may be poisoned soon after emerging and before they begin to migrate.

ORGANIZATION FOR POISONING

The greatest drawback to fighting the grasshopper is lack of funds. There are several ways of financing a poison campaign.

1. Poison furnished by the county commissioners. This plan is by far the best. The control of grasshoppers is not only a community affair, but a county problem as well. As an illustration, in one Idaho community where the crops were completely destroyed, the stores had to advance credit to the farmers until the next year's crops were harvested causing a hardship to everyone in the county, for the storekeepers could not afford to carry these accounts without charging an increase in prices. Because of \$25,000 or \$30,000 loss in one community business thruout the entire county was affected. Where poison is furnished by the county commissioners, farmers are eager to use their share and no individual has an excuse for failing to fight the grasshopper.

2. The county commissioners lending money for the purchase of supplies. The money thus lent is used as a revolving fund, each farmer paying for his share of the supplies when he receives them.

3. Assessment on the acre basis. The procedure in following this plan is to purchase supplies cooperatively and pay for them by assessing each farmer in proportion to the number of acres owned. The chief objection to this plan is that usually there are men in each community who are opposed to it, and will not work cooperatively. They reason that they are remote from possible injury, and would rather take the chance of losing heavily, than subscribe money which may not be needed to poison on their own

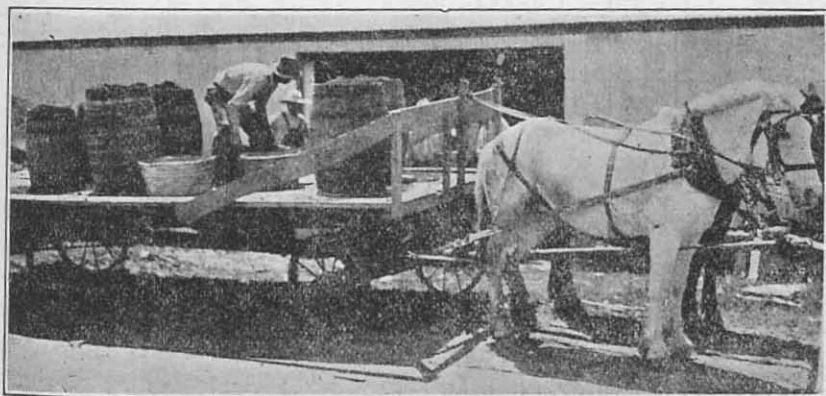
places. This type of farmer is unable to see that grasshoppers on his neighbor's place one year are likely to spread to his own farm sooner or later. It is very hard to secure cooperation by following this plan unless damage in previous years has been very severe, in which case the farmers are willing to try anything in their efforts to save their crops.

4. A straight donation of a specified amount by each man owning land in a community. This plan has perhaps been used more than any other and each man donating receives in return many times the amount of his donation in the value of crops saved. In case more money is subscribed than needed, it may be refunded at the close of the campaign. This plan is also open to the objection that it is difficult to secure cooperation when there are men in the community who are unwilling to contribute.

By following any of the plans mentioned above the expense of controlling the grasshopper may be greatly reduced. Supplies purchased in large quantities cost only from one-half to one-fifth as much as when bought by individuals. *It is extremely important that all supplies be ordered early enough so that they may be shipped by freight and be on hand before they are needed in the spring.*

COMMUNITY MIXING BEE

In any plan of cooperation, a community mixing bee is essential to the best results. All the supplies are concentrated at one place. Every man in the community, whether he is troubled with grasshoppers or not, will be there to help. The mixture is prepared



The poison mixture is loaded into waiting vehicles and carried to the places of distribution. Figure 9.

in large quantities, several groups working at once. There should be enough tools and supplies to keep every man busy. After the quantity necessary for all is mixed, it is loaded into the waiting vehicles and carried to the places of distribution. The men divide into groups of four or five, covering first one man's place, and then others'. This plan is quicker, more thoro and more encouraging than for each man to do the work alone. After the first application has been made, each individual needing more mixture goes to the place where the supplies are kept, gets all he needs, and works alone on his own place.

Most men are more enthusiastic and more willing to poison the grasshopper when they go to a mixing bee and know beyond a doubt that they are not the only ones working to exterminate the pest.

Donating money or paying assessments is only a moral obligation. There is no law in this state which compels a person to fight grasshoppers or to donate to a fund for that purpose.

POISON BRAN MASH FORMULA

Killing grasshoppers by the use of poison bran mash is the most effective method of destroying the young and adults. The Kansas formula which has been used with excellent results is as follows:

Bran—25 lbs.	\$.63
White arsenic—1 lb.25
Lemons— $\frac{1}{2}$ doz.20
Cheap molasses— $\frac{1}{2}$ gal.17
Water—3 to 4 gal.	
Total cost	\$1.25

Twenty-five pounds of bran covers five acres, making the cost per acre only 25 cents.

MIXING THE MASH

1. By the use of shovels, rakes, or hoes, mix thoroly together the bran and the poison in dry form.
2. Make a solution of the molasses in about two gallons of water.
3. Grind the lemons as fine as possible and add them to about two gallons of water.
4. Stir together thoroly, No. 1 and No. 2, then add No. 3 and mix the entire mass. Care should be taken not to add too much

water to the mash as it should not be wet enough to lump. When the mash is properly made it should contain just enough water that when a handful of it is squeezed firmly only a few drops of water will ooze out. If it is too wet and sticks together in lumps when sown, it loses much of its effectiveness, is dangerous to livestock, kills birds, and covers much less area. Best results are obtained when the mash is just moist enough so that when sown broadcast it scatters evenly over the ground.

If the mixture is sown thin and without lumping, there is absolutely no danger to livestock. A few animals have been killed thru carelessness when the farmers have left the poison exposed in the barn or barnyard. In one case, while several men were sowing the poison in the field, four horses and a large number of cattle, attracted by the smell of the molasses, followed the men around. The material was sown so thinly, however, that none of the animals was able to get enough poison to hurt it. This has been the case time after time. No stock has been killed in Idaho by poisoning. A few young chickens were killed by eating the poisoned grasshoppers. In one case in Colorado, in 1917, only one pig out of 553 which were feeding in poisoned fields, died of poisoning, and it was undoubtedly killed thru carelessness.

“Safety First,’ and No Regrets.” One cannot be too careful.

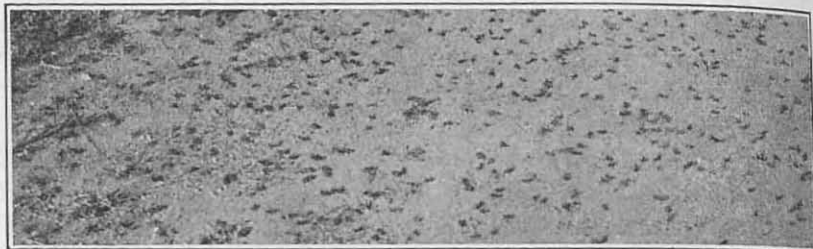
METHODS OF MIXING

If only a small quantity of poison mash is needed, a wash tub is large enough to mix it in. Larger amounts can be mixed in a wagon box, on a floor, or on canvas. When possible, canvas placed over the floor is best of all. In this way, no poison will sift thru cracks, making it possible for chickens or hogs to eat it, in case they are able to run under the shed. After mixing the poison with rakes, shovels or hoes, it can be further mixed by grasping edges of the canvas and rolling the mass back and forth from one edge to the other. This can easily be done by three or four men on each side of the canvas. It is more convenient and much faster to prepare quantities of only 100 pounds than to try larger amounts, and the poison can be more thoroly mixed.

TIME FOR DISTRIBUTION OF POISON

Grasshoppers eat most readily in the morning just after the sun has warmed them, and a few hours in the evening before they go to roost. About the time the sun sets, the adults begin to crawl

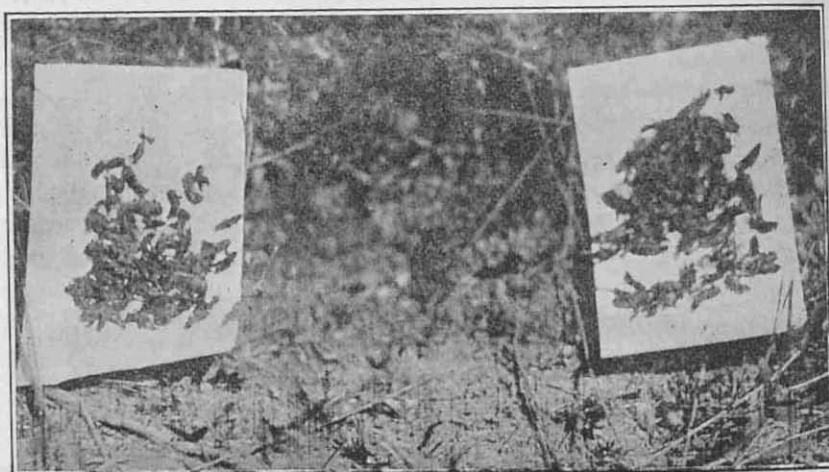
up any object near—fence posts, grass blades, or grain. The best results are obtained by sowing the poison between four and six o'clock in the afternoon. The sun does not dry the bran so quickly,



Dead and dying grasshoppers, the result of distribution of poison mash. Figure 10, and the grasshoppers thus have more hours for eating it, before it dries. If it is inconvenient to scatter the bran in the afternoon, good results may be obtained from sowing it early in the morning when the dew is on the plants, the dew keeping the bran moist much longer.

DISTRIBUTION OF POISON

In covering large areas, the most convenient method is by the use of an end-gate grain seeder. In order to use a seeder, bran must not be too wet. If no seeder is to be had, or if the ground is too rough to permit driving a wagon over it, scattering by hand is



Dead grasshoppers on these sheets of notebook paper were collected from the area between the papers. There are 105 dead grasshoppers. Result of poison sawdust application. Figure 11.

almost as good. Several farmers working together can cover a large field in a short time by lining up about twenty feet apart and walking thru the field scattering the bran as if seeding grain by hand. The bran will scatter more evenly if thrown into the breeze.

The poison mixture should be sown broadcast at the rate of from five to six pounds per acre. It is better to sow it too thin than too thick. Grasshoppers can eat only a small amount before it becomes dry and loses its effectiveness and if it is well scattered they will find it readily. The coarser the bran, the more evenly the poison can be mixed. Fine bran, or that containing shorts, is likely to form lumps.

Substitutes which have proven satisfactory are:

1. Amyl acetate has been used by Mr. J. R. Parker, assistant entomologist, at the Montana State College, as a substitute for cit-



Mixing grasshopper bait, Camas county. Using sawdust instead of bran.
Figure 12.

rus fruits, and excellent results have been obtained. In a series of experiments conducted by Mr. Parker, it was determined that lemons were the least attractive of all the materials used and that amyl acetate stood at the head of the list. An ounce of this material costs 5 cents, and in the poisoned mash is substituted for eight oranges, or lemons, which cost from 40 cents to 80 cents per dozen. When the cost is only 40 cents per dozen, 65 cents may be saved on each 100 pounds of bran mash, by this substitution. Amyl acetate is a liquid which may be kept indefinitely and used when needed. It has the decided advantage of being ready for use without grating or grinding and can be mixed more readily than fruit pulp.

2. A prepared grasshopper bait is being made in California, and is used and recommended by Mr. D. B. Mackie, field entomologist for the California Department of Agri-

culture. This consists of arsenic added to enough citrus fruit pulp to absorb all the poison. It can be purchased in cans, and may be kept indefinitely and used as needed. One can of this costs 92 cents (1920) and is sufficient for twenty-five pounds of bran. Mr. Mackie reports that this preparation, owing to the large proportion of citrus fruits that it contains, gives excellent results without the use of molasses.

3. In Camas county coarse sawdust was substituted for bran with satisfactory results. Fifty tons of sawdust were used, saving \$50 a ton, or \$2500. In future campaigns sawdust will be recommended where it seems practical for a community to substitute it for bran. The sawdust used should be coarse material. Fine sawdust is not good. Every man using the sawdust mixture in 1920 was well pleased with the results.

NATURAL ENEMIES

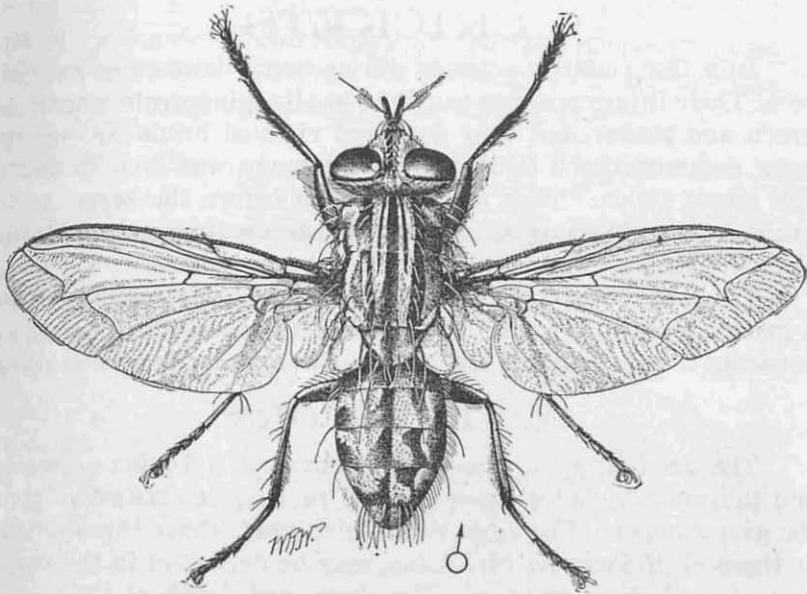
1. In some of the counties in 1919 and 1920 blackbirds played a great part in controlling the grasshoppers. Thousands of them were to be seen along the roadsides and in fields, devouring the pests. They were a greater factor in control than any known insect parasites.

2. Fungous Disease: Hundreds of dead grasshoppers were found hanging on the wheat heads. Their bodies were dry and brittle, shattering very easily. The cause of this was probably *Empusa grylli* Fres. The grasshoppers would die and remain on the plants until torn to pieces by the weather.

3. Certain species of flies are the greatest enemy to grasshoppers. These deposit living maggots on the adults, which bore thru the skin and into the intestines of the hosts. The hosts appear very sluggish and are unable to hop out of reach of anyone attempting to catch them. These were found particularly in the two-striped grasshopper (*Melanoplus bivittatus*) in 1920. In a great many cases the maggot completely filled the abdomen of the host.

4. Many of the eggs were destroyed by a small white maggot, the larva of a yellowish, bee-fly that is often seen around the harvest field. These would often devour all the eggs in the pod.

5. Blister Beetles and Ground Beetles. Frequently yellowish-white grubs may be found eating into the egg masses. These are the larvae of blister beetles and ground beetles. Only in rare



A two-winged fly (*Sarcophaga kellyi*) parasite on grasshoppers. An adult, about six times natural size. Figure 13.

cases do they become numerous enough to be considered a potent factor in control.

Parasites help more in some localities than in others. A large number of parasites may be present but still be of no particular help. They may also attack only one species, almost eradicating it, while other species may be doing damage. To be effective, parasites must be very numerous and it usually takes a year or two after they are known to be present for them to increase sufficiently to be a factor in grasshopper reduction. There may be only a small number of parasites when grasshoppers are present by millions. Thus they have a large number of hosts and multiply rapidly. In time they will have reduced the grasshoppers until there may be more parasites than hosts, in which case parasites will die for lack of food. The farmer cannot afford to trust to the possibility of relief by parasites.

CRICKETS

In a few counties crickets did as much damage as grasshoppers. Their injury was not confined to attacking grain when it was green and tender, but they damaged ripened heads as well. In some communities 5 to 10 per cent damage was done to timothy and wheat fields. They usually did not injure the kernels of the grain, but would gnaw on the stem just below the head, causing the stem to break and the head to fall to the ground.

The large Western cricket (*Anabrus simplex*) can be seen for a great distance clinging to the heads of the grain. As one approaches it will drop and disappear. Its jaws are large and strong.

LIFE HISTORY

The life history of the Western cricket (*Anabrus simplex*) and the sand cricket (*Stenopelmatus fuscus*) is similar to that of the grasshopper. The eggs, dull bluish-gray, three times as large as those of *Melanoplus bivittatus*, may be deposited in the ground or scattered about the top. The shape and depth of the holes in which the eggs are deposited vary. One hole may be narrow and deep, another long and shallow. The eggs are not placed symmetrically, but lie in all positions. Most of the pods are covered. A few, however, are not.

Adams, Cassia, Franklin, Idaho, Madison, and Valley counties were troubled in 1920.

CONTROL

Poison bran mash has proved very effective. Mr. D. P. Murray, county agent of Madison county, has used the following formula with good results.

Bran mash	25 lbs.
White arsenic	1 lb.
Onions (ground)	8-10 onions.
Sugar factory syrup.....	3 qts.

Just enough water is added to moisten the bran to make it sow well.

Best results are obtained by sowing poison in the spring rather than in late summer. The bait should be sown late in the evening or early in the morning. On cloudy days the crickets do not travel far, and remain on the poison for a longer time.

At one time crickets were close to the cultivated fields before they were noticed. In order to check them immediately fifteen or twenty men dug trenches about three feet deep and ten inches wide

at the top, and sixteen to eighteen inches at the bottom. Then in the trenches, about every two rods, a pit four feet deep with overhanging sides, was dug. This method of checking the crickets was very effective. The poison method was much cheaper.

WARNING

DO NOT use sodium arsenate or sodium arsenite as a spray for killing grasshoppers. These materials are not insecticides, but weed killing agents.

ACKNOWLEDGMENTS

Acknowledgments are due H. C. Severin for figure 5; U. S. Bureau of Entomology, for Figures 1, 2, 3 and 13; Professor F. L. Washburn for Figure 6; Glen W. Herrick, for Figure 7; Kansas State Agricultural College, for Figure 4; and Edward F. Mason, for figures 9, 10, 11 and 12.

ANNOUNCEMENT

Insect Laboratory Conducted by Extension Division

In order to learn of the injurious insects of Idaho and know how to combat them, it is necessary to maintain a complete record of the localities where they occur, the plants they feed on, and the injury they do as well as the names and species of the insects themselves. A great deal of this information can be supplied by farmers and county workers, but the determination of species will necessarily be restricted to specialists.

To meet an apparent need, the Extension Division has established an insect laboratory in Boise. It is well equipped for mounting, rearing, and collecting crickets, and a specialist will be in attendance at all times to receive and care for any material sent by the farmers or county workers of the state. The complete cooperation of all concerned is desired, and to aid both the specialists and the public the following directions should be closely followed:

1. If larvae or "worms" are destroying vegetation or crops, enclose a few of them in a strong box with some of the green food on which they are feeding, and mail it to the Extension Entomologist, Boise, Idaho.
2. If adults (moths, beetles, etc.), are sent, put them in a strong box, wrap securely and mail. Individuals will be less likely to become damaged if wrapped tightly in soft tissue paper or cotton, and a number of insects packed together without protection may destroy one another.
3. Insects should never be placed in bottles with tight stoppers as the moisture is likely to soon spoil them. If a bottle is used, use soft cotton for a stopper.
4. Never send insects in a letter or in a fragile package. It is not uncommon to receive the remains of a package or letter, but the insects have been completely lost or destroyed in transit.
5. Write a letter stating facts about food plants of injurious insects, nature and extent of damage. Address all letters and packages to Entomologist, University Extension Division, Boise, Idaho.