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How To Control Grasshoppers In Oklahoma

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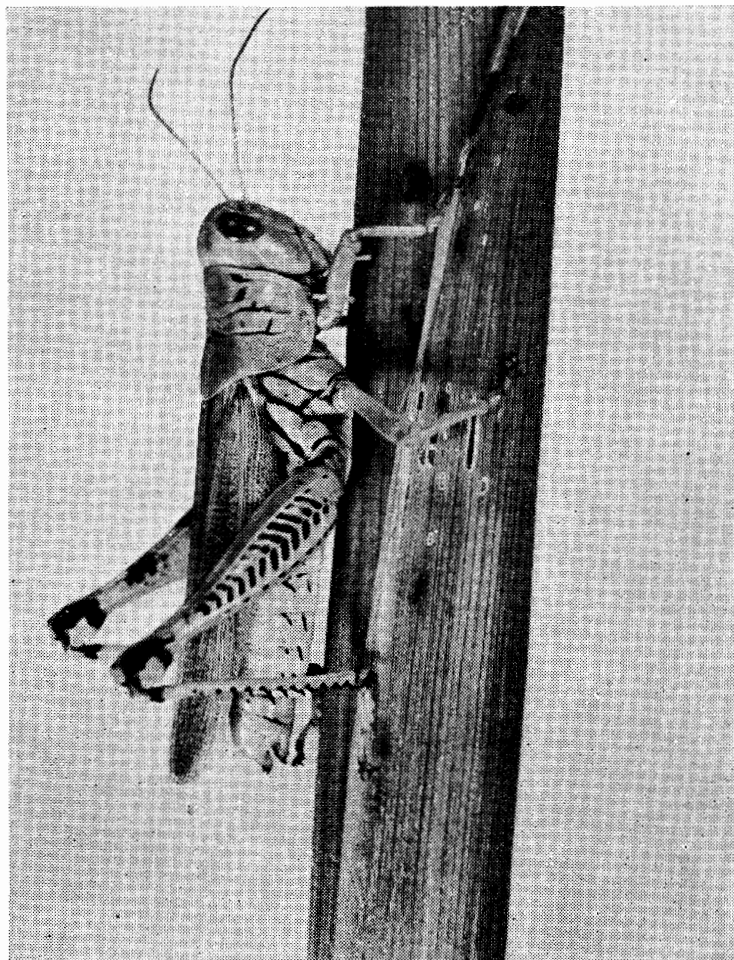


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HOW TO CONTROL GRASSHOPPERS IN OKLAHOMA

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Grasshoppers have become unusually abundant and destructive in Oklahoma during the past two years. In 1936, it is estimated that 59,000 bales of cotton were destroyed by these pests and in addition thousands of acres of corn were ruined that otherwise would have made a partial crop despite the drought (Fig. 2). Shade and fruit trees were defoliated and often killed, since in many cases the bark was eaten off, girdling them. The insects also destroyed the second cutting of alfalfa over a large part of the State and killed large areas in many fields necessitating replanting. While not so wide spread and destructive in the State in other years, grasshoppers are always an enemy to reckon with and become locally abundant in parts of the State every year.

CONTROL GRASSHOPPERS WITH POISONED BAIT

The best method to combat grasshoppers is by the use of poison bait, or poisoned bran mash, as it is sometimes called. The Oklahoma Agricultural Experiment Station has tested out many formulas of which the following three proved to be the best.

Formula 1

Bran	100 lbs.
Sodium arsenite (4-lb. material)	2 qts.
Water	10-12 gals.

Formula 2

Bran	50 lbs.
Sawdust	50 lbs.
Sodium arsenite (4-lb. material)	2 qts.
Water	10-12 gals.

Formula 3

Bran	50 lbs.
Cottonseed hulls	50 lbs.
Sodium arsenite (4 lb. material)	2 qts.
Water	Approx. 12 gals.

White arsenic at the rate of 5 pounds to each 100 pounds of the carrier, is effective and may be used as poison in the bait. Paris green may also be used, but is more expensive. Neither lead arsenate nor calcium arsenate are effective poisons for grasshopper baits.

The use of such flavoring materials as amyl acetate, crushed oranges, etc. is not recommended. When dry poisons such as Paris green or white arsenic are used, molasses may be added to the bait as a binder. The somewhat greater kill obtained, however, will not usually pay for the increased cost of the bait when molasses is used.

HOW TO MIX POISONED BAIT

The bait may be mixed on a tight floor of a barn or warehouse (Fig. 1). A cement mixing trough six or eight inches deep is good. Concrete mixers are sometimes used.



(Courtesy Iowa Experiment Station)
Fig. 1. Mixing grasshopper bait on a concrete floor.

Shovels or hoes may be used to mix dry poison with the carrier, to mix the bran with sawdust or other diluent, and to stir in the water or diluted liquid poison.

Method When Dry Poison is Used.

1. Thoroughly mix the cottonseed hulls or sawdust with the bran if either are to be used.
2. Next mix the white arsenic or Paris green thoroughly with the bran or other carrier.

3. Add approximately 12 gallons of water and stir with a shovel or hoe until every bran particle is moistened. There should be sufficient water in the mixture so that when squeezed by the hand, a little will ooze out between the fingers. Too much water will make the bait sloppy and it is then impossible to spread it properly.

Method When Liquid Poison is Used.

1. Mix the dry ingredients in the same manner as recommended when dry poison is to be used.
2. Add the sodium arsenite to the water, stirring until thoroughly diluted.
3. Pour the diluted poison over the bran and stir the entire mixture thoroughly.

PRECAUTIONS

1. Sack the prepared bait immediately and store where livestock and poultry cannot get to it.
2. Thoroughly wash and rinse out all containers, shovels, etc. used in mixing the bait to avoid any possibility of accidental poisoning.
3. Mix dry poison such as white arsenic in a well ventilated room or in the open air to avoid inhaling any of the poisonous dust.
4. Protect hands with grease or vaseline and work grease or soap under the finger nails if much bait is to be mixed. Rubber gloves are good protection.
5. Burn sacks used in storing or handling the bait and scatter the ashes.

BROADCAST BAIT WHEN GRASSHOPPERS ARE FEEDING

During ordinary hot, dry summer weather, grasshoppers do most of their feeding between 7:00 a. m. and 10:00 a. m. The bait should therefore be spread in the early morning between daylight, and 7:00 or 7:30 o'clock.

During the early part of the season when morning temperatures remain below 70 degrees, the feeding period will be delayed until the temperature rises. Under such circumstances the spreading of the bait may be delayed until the grasshoppers begin to feed. No bait should be broadcast in rainy weather or when heavy clouds obscure the sun.

Use 10 to 15 pounds of the bait (dry weight) per acre. Broadcast by hand while walking or from the rear end of a wagon or truck driven across the field. Special machines can be purchased or constructed for scattering the bait over large

fields and these are recommended where the acreage to be treated is extensive.

TREATING ALFALFA FIELDS

It is very important to kill grasshoppers in alfalfa fields before they are cut because otherwise the insects will invade other crops such as corn and cotton. The bait may be scattered over the entire field or an uncut swath can be left around the margins and in the middle. The grasshoppers will congregate in the uncut alfalfa where they can be poisoned more economically.

PROTECTING CORN

If possible, poison grasshoppers before they have a chance to invade corn fields because they are very difficult to control in corn. Once corn is infested spread the bait on the ground between the rows. Poison bait thrown on the plants may burn the leaves.



Fig. 2. The result of failure to control grasshoppers.

PROTECTING COTTON AND OTHER ROW CROPS

Grasshoppers usually start at the edges of a cotton field and work towards the middle. It is therefore usually possible to combat them by spreading the bait down the middles where they are working and also a little ahead of them. Where row crops are infested throughout, the bait must be broadcast over the entire field.

CHECK RESULTS OF POISONING CAREFULLY

Do not expect to get the maximum kill immediately. The full effect of the poison is often not noticed for three days after treatment. If grasshoppers are still sufficiently numerous to cause damage they are probably migrating into the field from unbaited territory and the field should be poisoned a second time. When dying from the effects of the poison, grasshoppers seek shade and water. Many disappear from treated fields and die under trees and shrubbery around their borders. Remember that full grown grasshoppers are winged and migrate from field to field. For this reason it is better to poison early in the season before wings are developed.

COMMUNITY POISONING BEST

One farmer cannot expect to get best results from poisoning if his neighbors do not cooperate. It is better for an entire community to join in the campaign.

CONTROL GRASSHOPPERS IN THEIR BREEDING GROUNDS

If large numbers of adult grasshoppers are present in the fall, they should be poisoned even though they are causing no injury because they are laying eggs for next year's generation. It is good practice to poison systematically all weed areas along fence rows since it is in such places that grasshoppers lay their eggs and develop before invading crops (Fig. 3). In Oklahoma, alfalfa is especially attractive to grasshoppers for egg deposition. Watch alfalfa fields and pastures and poison them when necessary.

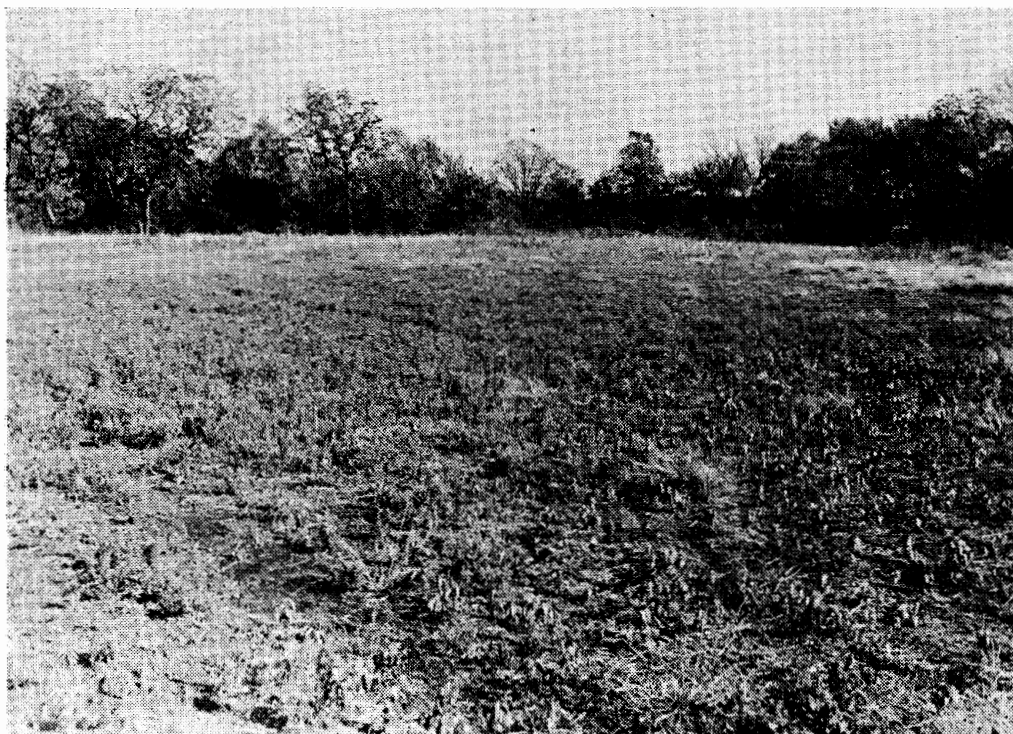


Fig. 3. A favorite breeding ground for grasshoppers.

Eggs are often laid in the soil along the margins of alfalfa fields.

The best time of the year to control grasshoppers is in the spring after they have started hatching, but before they have traveled very far from the egg beds. Much less bait is needed at this time since the hoppers are concentrated in comparatively restricted places. Hatching takes place over a several weeks period so it is usually necessary to spread poison bait several times. Egg beds are found in the soil along roadsides, fence rows and edges of fields. In Oklahoma the most serious infestations often develop in fields along creek bottoms.

**POISON BAIT PROPERLY SCATTERED WILL NOT
KILL LIVESTOCK**

Livestock and poultry are attracted to grasshopper bait, and if it is left carelessly in places where they can get to it before it has been spread, they will soon eat enough to kill them. Bait will also kill animals and birds if it is dumped from a wagon in large handfulls or if it is so wet that it is sloppy, and falls in piles when spread. If, however, it is mixed and spread properly there is no danger. It should be dry enough so that it will flake out and fall in small crumbs when thrown by the hand. (Fig. 4). In this way, it can be spread in fields where animals are pastured with no danger of poisoning.

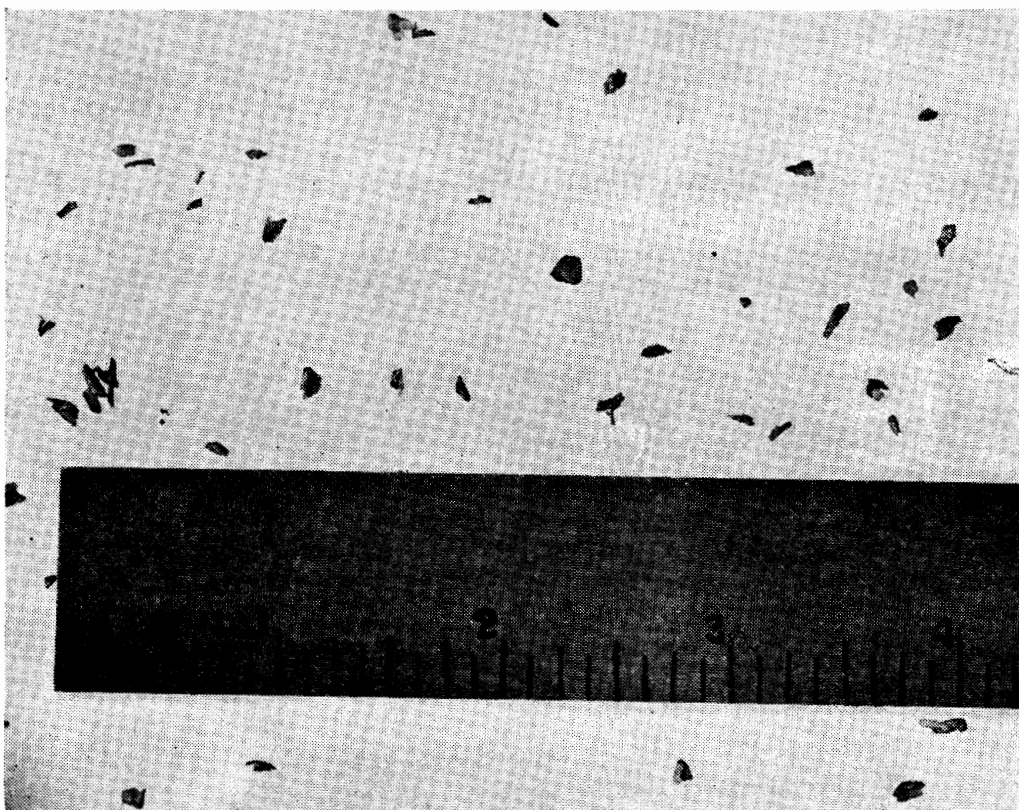


Fig. 4 Close-up showing proper distribution of scattered poison bait.

Avoid mixing too much water so that the bait falls in piles or in lumps.

The bait may be spread in alfalfa fields that are to be cut with no danger of the hay being poisoned enough to hurt animals. Most of it falls to the ground and the rest is soon dislodged by winds before the alfalfa is ready for cutting.

NO DANGER TO POULTRY, SONG OR GAME BIRDS

Extensive experiments conducted at this station over a period of two years have definitely proved that very few poisoned grasshoppers are eaten by poultry and those they do eat do not harm them. Even under conditions of starvation, poultry still refused to eat more than a few poisoned grasshoppers. Experiments with quail and song birds gave similar results. It is therefore evident that grasshopper control campaigns will have little if any harmful effect on the game and song bird populations.

SPECIES OF GRASSHOPPERS INJURIOUS IN OKLAHOMA

There are at least four species of injurious grasshoppers in Oklahoma. During the past two years over most of the state the differential grasshopper was the most abundant and destructive. (See cover.) It hatches fairly early and remains active until first frost in late October or early November. It ranges in length from $1\frac{3}{4}$ inches to $1\frac{5}{8}$ inches from head to wing tip and is usually of a dull yellowish or olive green color with black markings especially noticeable as bands and chevrons on the hind legs.

Associated with this species was the two-striped grasshopper, so called because of the two narrow yellowish stripes extending from the eyes across the back and down the wing covers. The general color is brown above and yellowish beneath. It is somewhat more robust than the differential grasshopper and slightly larger. The two-striped grasshopper has largely disappeared by mid-September.

The lesser migratory grasshopper was the third destructive species. It is smaller than the other two, ranging in size from a little less than an inch to $1\frac{1}{16}$ inches. The body is brown above and yellow below. The wing covers are flecked with black areas on their sides and the hind legs are reddish to yellow in color.

In the panhandle section of the state the long winged plains grasshopper caused great damage. This is a western species inhabiting semi-desert areas, and so will probably spread very little if any, eastwards. This species ranges in length from $1\frac{3}{4}$ to $2\frac{3}{16}$ inches. The general color is brown with the lighter brown color of the wings flecked with darker brown markings; which in the male form 3 to 4 bands across the terminal third of the wing. The sides of the head in back

of and below the eyes are indistinctly mottled with dark and light brown markings. The pronotum or "collar" in back of the head is elevated into a distinct crest which is quite characteristic. This species feeds on grama grass, buffalo grass and mesquite grass. It has a record of completely devastating fields of maize, kafir, corn and millet, especially the latter. Some varieties of sorghum are fed upon only to a slight extent while vegetable crops are especially susceptible.

LIFE CYCLE OF DESTRUCTIVE GRASSHOPPERS

The female grasshopper lays her eggs in the late summer and fall in the soil as far down as her abdomen will reach (Fig. 5). She prefers weedy areas bordering alfalfa fields, paths along the margins of fields, hard packed soil along fence rows, or, in the case of the long winged plains grasshopper, the sandy hills of waste land. Often the eggs are inserted among the roots of a loose clump of grass or alfalfa. The eggs are tan colored, elongate, seed-like objects contained in a capsule or pod made of particles of soil cemented together by the female during the act of egg laying. The young hoppers start hatching in late April and May and for a few days remain near the egg bed. Then they begin to disperse, but usually remain in weedy or grassy areas so long as these stay green and supply a sufficient amount of food. They spread over alfalfa fields fairly early. When small grain is cut there is a further concentration on alfalfa and some movement into row crops may take place. When alfalfa is cut they are forced to invade such crops as corn, grain sorghums, cotton, soybeans and gardens. Older sorghum plants may be eaten slightly, but as a rule this crop is immune. Wings are developed in June and from this time on there is considerable movement and shifting about of grasshopper populations. In the extreme heat of mid-summer they tend to congregate in shrubs and trees in shaded areas along creek bottoms. There is but one generation a year, although the lesser migratory grasshopper may produce a second generation under certain conditions.

The habits of the long winged plains grasshopper are quite different in many respects from those of the three other species mentioned. This species has the habit of massing together



Fig. 5. Close-up of soil cross section showing grasshopper eggs.

Note several clusters of eggs in the soil intermingled with the grass roots. The surrounding capsules of soil protecting the egg masses have been removed to show the eggs.

and traveling over barren areas in immense bands, massed closely together and all going in the same direction. The adults are readily attracted to lights and are strong fliers. Thus the species may be considered as having strong migratory tendencies and may invade areas outside of its normal breeding range.