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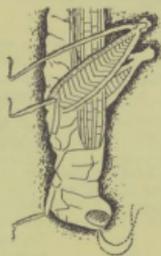
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Cooperative Extension Service

Grasshoppers AND THEIR CONTROL



control
grasshoppers
with
insecticides

Grasshoppers and Their Control

Grasshoppers are a problem every year in some areas of South Dakota. Unless controlled, they may damage or destroy crops, range forages, gardens, and other types of vegetation, with losses amounting to many thousands of dollars.

WEATHER AFFECTS GRASSHOPPERS

The weather plays an important part in the grasshopper's life. Its body temperature goes up and down with the surrounding air temperature. Unlike warm blooded animals, the hopper can not protect itself from temperature changes. Its movement and feeding activities are coordinated with the existing temperature.

Between 70° and 90° F., hopper activities increase with the temperature increase. Below or above these points, the activities slow down. In the colder weather, hoppers seek shelter in and under debris on the ground. In hot weather, 90° or above, they will work and rest near the tops of the vegetation or may take to the air if they are adults with developed wings. This latter activity will often result in the migration of large numbers if there is a wind to carry them across country.

When hoppers hatch, they must have food within a short time or die. If the temperature is cool and does not exceed 65° F., these young hoppers will die in a few days. If the young hopper can survive the first 10 days after hatching, he stands a fair chance of reaching maturity.

Since hoppers do most of their feeding while the temperature is between 70° and 90° F., an insecticide used on plants that they eat should be applied when the temperature is in this range.

By Gale B. Mast, Extension Entomologist

Heavy rains will often kill, wash away, or beat into the ground the young hopper which has just emerged from the egg. However, heavy rains or even hail storms do not often kill hoppers which are a few days old.

Hopper outbreaks have often been linked to drouth conditions. During wet years, hoppers are not the problem they are during dry years, but this does not mean that if we have a wet year we do not have hopper problems. The crops may be able to withstand the hoppers better and still produce a crop if there is enough moisture.

NATURAL CONTROL

A grasshopper population is made up of approximately half males and half females. Each female may lay 200 to 300 eggs in the fall. If all these eggs hatched and the hoppers all survived, we would have 100 to 150 times as many grasshoppers the following year. Fortunately, nature maintains a balance by cutting down on this enormous number of young. With hoppers, the natural balances are weather, parasites, predators, and disease, which annually kill off at least 90% of this "100 to 150 times" potential.

There are two common beetles and one fly whose larvae feed on hopper eggs in the pod. These are blister beetles, ground beetles, and bee fly larvae. There is also a mite which sucks the fluids from hopper eggs. There are others such as a wasp which lays its egg in the pod in the spring and an adult wasp, instead of the hopper, emerges from the pod. Some flies deposit eggs or larvae on the hopper and these larvae devour the hopper from the inside. Some nematodes may also live in the hopper and cause it to die.

Fungus and bacterial diseases destroy many hoppers when conditions are right.

Crop	Insecticide		Waiting period - minimum days from last application to harvest or feeding		Where and when to apply	Safety regulations
	Common name	Dosage per acre*	Tolerance, p.p.m.			
Corn and Sorghum	Aldrin	2 to 4 oz. E.C.	0	21 (2 oz.) 30 (4 oz.)	To hatching areas when nymphs are young.	Do not feed forage or silage treated with aldrin, chlordane, dieldrin, or toxaphene, to dairy animals or animals being finished for slaughter. Do not apply aldrin or dieldrin more than once.
	Chlordane	¼ to 1½ lb. E.C.	0.3	—		
	Dieldrin	1-2 oz. E.C.	—	40		
	Toxaphene	1 to 1½ lb. E.C.	7	—		
Small Grains	Sevin	1 to 3 lb. W.P.	—	21	To hatching areas when nymphs are young.	Do not apply chlordane after heads begin to form, or toxaphene more than once thereafter. Do not allow grazing on fields treated with chlordane. Do not allow dairy cows or animals being finished for slaughter to graze on fields treated with toxaphene.
	Aldrin	2-4 oz. E.C.	0.75 straw 0.1 grain	30 7		
	Chlordane	¼-1½ lb. E.C.	—	—		
	Dieldrin	1 to 2 oz. E.C.	0.75 straw 0.1 grain	7 7		
	Malathion	1 lb. E.C.	8	7		
Alfalfa and Clover Forage	Toxaphene	1 to 1½ lb. E.C.	5	14—barley 7—others	After cutting and before plants are 6" tall. While hoppers are small.	Do not graze dieldrin-treated field until following cutting is removed. Do not feed dieldrin-treated forage to dairy animals or animals being finished for slaughter.
	Diazinon	½ lb. E.C.	3 fresh forage 10 hay	7 —		
Pasture and Range	Dibrom	¼ lb. E.C.	—	4	When hatching of dominant species is complete and before eggs are laid.	Toxaphene: Do not treat pastures with toxaphene more than once per season. Do not graze dairy animals in treated fields. Do not graze meat animals in treated field within 6 weeks of slaughter. Toxaphene should not be used near lakes, streams, or ponds. Aldrin and heptachlor: Do not graze dairy animals on grass treated with aldrin or heptachlor. Do not graze animals being finished for slaughter on pastures treated with aldrin or heptachlor for 90 days after treatment. Use only sevin, malathion, or toxaphene on range being grazed by feeders, slaughter animals, or breeding stock.
	Malathion	1 lb. E.C.	8	7		
	Sevin	¼-1 lb.	100	—		
	Dieldrin	¼-1 oz. E.C.	0	35		
	Toxaphene	1-1½ lb. E.C. or oil solution	—	—		
Alfalfa Seed Fields, Field Margins, Wastelands, and Conservation Reserve Lands	Aldrin	2-4 oz. E.C. or oil solution	—	—	When hatching of dominant species incomplete and before eggs are laid.	Do not feed or graze. Do not spray alfalfa seed fields while in bloom because of the damage to bees working in the field. If it is necessary to spray during bloom period, apply toxaphene from 7 p.m. to 7 a.m. when bees are not working.
	Chlordane	¼-1½ lb. E.C. or oil solution	—	—		
	Dieldrin	1-2 oz. E.C. or oil solution	—	—		
	Heptachlor	2-3 oz. E.C. or oil solution	—	—		
	Toxaphene	1-1½ lb. E.C. or oil solution	—	—		
Yard Garden	Sevin	½-1 lb. W.P.	—	—	Only around outer margin of garden to kill hoppers before they move in.	Do not spray vegetables. Do not spray edible portion of vegetables within 7 days of harvest.
	Dieldrin	1 Tbsp. 15% E.C. /1 gal. water	—	—		
	Sevin	2 Tbsp. 50% W.P. /1 gal. water	—	—		
	Toxaphene	2 Tbsp. 60% E.C. /1 gal. water	—	—		
	Malathion	2 Tbsp. 25% W.P. /1 gal. water	—	7		

*D.—Dust, W.P.—Wettable powder, W.S.—Water soluble powder, E.C.—Emulsifiable concentrate, G.—Granule.

EFFECTS OF CULTIVATION

Cultivation plays an important part in grasshopper populations. Breaking up the sod of our native prairies and seeding it with crops has produced conditions for cyclic outbreaks of the crop-invading species. Growing corn, alfalfa, and other crops insures an abundant late food supply.

Grazing pasture lands makes a short grass sod condition favorable for hoppers which like to lay their eggs in grass clumps.

Hoppers will not breed in well-tilled fields, thus fence rows, road ditches, range lands, and fields of alfalfa and clover are the chief sources of infestation. Where stubble fields are thoroughly worked in the late fall or early spring before eggs hatch, the infestations in those fields are usually destroyed. In the wheat area where clean summer fallow is practiced, this tillage becomes an important control measure.

CONTROL WITH INSECTICIDES

Proper timing of spraying along with proper selection of fields, plus the roadsides and margins, is very important in getting the best control possible

for each dollar spent. Rates of application in the table include a lower and an upper range limit. These are expressed in terms of actual insecticide per acre. Use lower rates on young, newly hatched grasshoppers in short, dense, leafy vegetation. Use the higher dosages in tall and dense vegetation when the grasshoppers are full-grown, if the vegetation is dry, or when the temperature is high.

Many insecticides will control grasshoppers: malathion, aldrin, chlordane, dieldrin, heptachlor, sevin, dibrom, diazinon, and toxaphene. The choice of chemical will depend upon the crop or situation where used, the required waiting period, local availability, and the cost per acre.

These chemicals are usually available in different formulations: oil solutions, emulsifiable concentrates, wettable powders, and dusts. In the average low volume, low gallonage farm sprayer, use only the emulsifiable form. Oil solutions, diluted with an oil such as diesel fuel, are used mainly in aerial applications. Wettable powders are designed for use in high gallonage, high pressure sprayers with mechanical agitation. The dry dust forms are to be used in dusters, applied dry.

Be sure to measure and handle chemicals carefully. Follow directions and heed any precautions indicated on the label for best results and the safety of yourself and others.

