



# Extension Extra

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## I.P.M. Strategies for GRASSHOPPER CONTROL in South Dakota

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Grasshopper populations have been building statewide in South Dakota for the last couple of years. Historically, grasshoppers follow a cycle as populations build to levels that cause concern to the state's farmers and ranchers and then decrease to manageable levels. Normally, the grasshopper cycle in South Dakota is about seven to ten years.

Currently, areas of South Dakota are at the building stage of the grasshopper population cycle and all indications are that the 1997 growing season will have a problem with the pest. The western and central counties of the state have been experiencing most of the increased grasshopper population growth to date.

In the past, there has been federal assistance available for grasshopper control programs. These programs involved block spraying of grassland acres in western South Dakota counties. That type of program is not available, so producers must work out a plan to keep grasshopper populations in check while keeping preventative and control methods economically and environmentally sound.

Young grasshoppers (nymphs) found in South Dakota require about 45 days to develop to the adult stage. This process can vary from 40 to 60 days depending on environmental conditions. Eggs are deposited in the soil the previous fall and will start hatching about 14 days after soil temperatures reach 60F. Typical hatching areas are roadside ditches, dry grasslands, and other uncultivated locations. The two-striped grasshopper is usually the first species to hatch.

Normally around mid-May the main hatching activity will start. Usually by the first part of June all five of the species that normally are of concern in South Dakota are hatching. Hatching will continue for about a six-week period and then slow during the late summer months.

Grasshoppers will shed their skin (exoskeleton) as they develop and mature. Shedding will happen five times before grasshoppers reach the adult stage. Each stage is referred to as an instar.

The important thing to remember is that once the grasshopper has reached the mature stage, its appetite has decreased and chemical control at this point is only revenge for the producer.

### Scouting Grasshoppers

One of the best ways to monitor grasshopper populations is by using a standard 15-inch-diameter sweep net. Visual estimates also can be done but are not as accurate and effective as a sweep net. Grasshopper density can be estimated by walking through an area while making 180-degree (half circle) net sweeps through the vegetation. Make about 40 sweeps per location in at least 3 difference areas per mile of right-of-way or field margin. Divide the number of grasshoppers collected in 40 sweeps by 10 to estimate the density of grasshoppers per square yard.

If a sweep net is not available, visual counts to estimate grasshopper populations are satisfactory. Walk slowly and count the number of grasshoppers that move

within a square foot area. Make observations at several sites per field, and divide the total number of grasshoppers counted by the number of sites. Multiply by 9 to estimate density of grasshoppers per square yard.

### Economic Thresholds

The following guidelines can be adapted to each particular situation when evaluating action levels for grasshopper control. Generally, treatment is considered when grasshopper populations reach the threatening level. The following control thresholds are suggestions for South Dakota:

#### Right-of-Way

Treat the right-of-way when grasshoppers reach the threatening level of 50 nymphs per square yard. Treat before 5% reach the adult stage.

#### CRP, Wastelands, Grassy Ravines

Treat when 35-45 nymphs or 20-40 adults are present per square yard and pose a threat to neighboring cropland or pasture.

#### Field Crops

Treat when 15-20 nymphs or 8 adults are present per square yard. Assess on the basis of growing conditions, stage of crop, and grasshopper numbers.

High grasshopper populations may be treated in field borders to prevent movement into crop fields. Consider treatment when economic thresholds for border treatments are reached. Generally, this would be 20 or more grasshoppers per square yard in the field margin.

### Integrated Pest Management Options

During past grasshopper infestations, programs were available that involved block spraying of many acres of grassland in many western South Dakota counties. These grassland or range acres provided a highly suitable habitat for grasshoppers to lay eggs.

Producers concerned with the cost involved with a broadbased control measure on large numbers of acres may want to consider some of the reduced pesticide options available.

The use of bran baits or strip treatments in pasture and range situations are two ways that producers can reduce control measure costs and still keep the grasshopper populations at manageable levels.

The use of bran baits offers increased environmental and economic benefits when compared to extensive broadbased chemical treatments. For example, carbaryl-bran bait with 2% active ingredient (AI) by weight applied at 2 lb/acre offers 92 to 97% less active ingredient compared to conventional liquid formulations of carbaryl (Sevin)(0.5 to 1.5 lb AI/acre). The bran baits also offer reduced cost for applications, improved applicator safety, and minimized risk to nontarget species.

It has been noted that the carbaryl (Sevin) bait treatments seem to have greater success in larger control areas like western South Dakota counties.

Poorer results with bran bait applications to satisfactorily control grasshoppers have been more evident in the eastern part of South Dakota. This is because the roadside areas have a much denser canopy and groundcover. Grasshoppers prefer an open canopy over shaded areas, and the denser canopy will affect their ability to find the bran flakes that may settle out. Grasshoppers hatching several days following a bran bait application may not be effectively controlled because bran baits lack residual ability.

Even with the canopy factor, bran baits are still a strong option to consider when other methods are impossible to use. Partial control from bran baits may be sufficient to reduce further movement of grasshoppers into adjacent row crop fields.

**Grasshopper nymph and adult infestation ratings based on numbers per square yard.**

Ratings	Nymphs / sq yard		Adults / sq yard	
	Margin	Field	Margin	Field
Light	25-35	15-23	10-20	3-7
Threatening	50-75	30-45	21-40	2-14
Severe	100-150	60-90	41-80	15-28
Very severe	200+	120	80	28+

## Bait Application Equipment

The Brie-Mar® Applicators Division of Peacock Industries (Saskatoon, SK) has developed three bran bait spreaders (Models 10, 30, and 60). These spreaders are equipped with gasoline-powered air driven delivery systems that provide uniform flake distribution and can be set to deliver bran at various application rates. The spreaders have noncorrodible bran hoppers, are relatively inexpensive and easily operated, and require minimal maintenance.

### Model 10

This unit is a shoulder-mounted backpack system that works well for small jobs, such as a roadside ditch and yard or garden uses. It weighs 27 pounds, holds 14 lbs of bran, and can deliver 1.2 or 3 lbs of bran/acre in 20 to 25 ft swaths with the operator walking at 3 miles per hour.

### Model 30

This bran spreader is designed for mounting on an all-terrain vehicle (ATV) or pickup truck, and it can be used for bran applications in small and moderate-size grasshopper outbreak areas. Some examples of this type of situation would be isolated hot-spots in rangeland and pasture, roadside ditch areas, rowcrop and forage field margins, large lawns, commercial vegetable gardens, and golf courses.

This applicator can be used to treat outbreaks in very rough terrain where travel with a tractor or pickup may be difficult or impossible. Like the Model 10, the Model 30 system delivers bran flakes in a 20-25 ft swath. It's two-speed feed roll can deliver either 1 or 2 pounds of bran/acre at 10 miles/hour, and it can hold up to 45 pounds of bran.

### Model 60

This applicator is a larger unit that may be used for a range of different situations. It is designed for

moderate-size outbreaks in areas where aerial treatment is not economically practical. The Model 60 is well suited for conditions where the Model 30 can be used (provided a pickup or tractor can safely go over the terrain where the application needs to be made).

This unit allows the operator to apply bran at 0.9, 2.1, 3, and 4 lbs/acre in 40- to 45-ft-swath widths at 10 miles/hour. Its hopper can hold up to 135 lbs of bran flakes. The bran output is turned on and off from within the pickup or tractor cab, and swath direction can easily be switched from right to left by manually moving the output tube.

As with any chemical application, the calibration of the equipment is a very important means of assuring the accuracy of the application.

## Alternate Swath Spraying

Another form of grasshopper control concentrating on reduced chemical applications and cost is using strips of chemical treatments in grasshopper infested areas.

Studies done at SDSU using strip treatments on a small scale showed encouraging results. These studies focused on treating strips where 25 and 50% of the test plot were left untreated. This resulted in decreased insecticide input by 20 and 31% respectively.

The strip treatment method not only has the potential to reduce the cost of control, but reduces the amount of insecticide introduced into the environment, which would decrease the impact of chemicals on non-target beneficial organisms. Control studies of immature grasshoppers in the study showed virtually identical control in strip applications as in plots where the entire area was treated. Work has been done with this concept on a larger scale in Wyoming and North Dakota and is showing similar results.

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