

Get the Jump on Grasshoppers



Grasshopper control can be beneficial in dry years.

by Heather Smith Thomas

Hoards of grasshoppers or Mormon crickets can quickly decimate a forage crop or pasture. If your area is prone to high numbers, control strategies may be beneficial, and it pays to plan ahead. The best planning starts with anticipating what might be coming next year.

Grasshoppers can be a problem anywhere, but their detrimental effects are most damaging in dry climates, since vegetation is more sparse, says Charles Brown, rangeland grasshopper and Mormon cricket suppression program policy manager for the Plant Protection and Quarantine (PPQ) unit of USDA's Animal Plant Health Inspection Service (APHIS).

Nearly 400 species of grasshoppers are native to the 17 western states, but only a dozen or so feed on grasses and have the capacity to reach high populations quickly and spread to other areas. Mormon crickets are closely related insects and are also highly mobile and capable of

migrating long distances. In large numbers, they may devour nearly all forage plants in their path.

"If there is enough vegetation, effects of grasshoppers might not be as drastic as in dry regions of the West," Brown says. When forage is in short supply, however, ranchers can't afford to have grasshoppers eating their cattle feed.

Suppression efforts are generally aimed at the bad years, but it's not always easy to determine which years will be bad.

"We try to predict when outbreaks are going to occur, but unfortunately have not found the magic formula," he says. Weather makes a difference, especially when the insects are hatching. A cold snap or a large rain during a hatch can substantially reduce what would have been an outbreak population.

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PHOTOS COURTESY USDA APHIS

difficult," Brown says. "Local conditions can be variable." One area may get 2 inches (in.) of rain, while neighbors over the hill get none.

"We do surveys in the spring, in areas that — based on surveys from the previous year — we think might be hot spots. We try to get a feel for what the populations are doing. Often, however, the land managers or range permittees are more familiar with what is happening on their land. They can contact our state plant health director if they want us to take a look, or they can contact their extension agent," says Brown.

Wetter climates still susceptible

Although the arid West generally has the worst grasshopper problems, these pests can occasionally be damaging in wetter climates if weather is drier than normal. Rocky Lemus, extension forage specialist at Mississippi State

► There are two methods of application — by plane, spraying the bait over the land, and by ground equipment, such as an ATV. Choices will depend on terrain and individual situation. **Inset photo:** Some species that tend to have large outbreaks will have fairly consolidated egg beds. The ground in those areas will be boiling with young grasshoppers.



University, says that if eastern or southern states see a grasshopper problem, it's usually toward the end of summer.

"We see grasshoppers in late July, August and part of September, especially if we have drought conditions. A minor infestation may not reach an economic threshold in forage crops," says Lemus. "One reason we often don't have grasshopper problems in the South is that some of the insecticides we use for control of army worms also impact grasshopper populations."

In situations where a producer is not already using an insecticide for some other pest, grasshoppers could become a problem in certain years.

"Then we'd look at the economic threshold — at what point it will be cost-effective to control grasshoppers," he suggests. "If you have more than five grasshoppers per square foot in a field or pasture, you might consider some kind of treatment."

Producers can monitor grasshopper numbers, though it can be difficult to count them. The best time to count is when they are young and small, and not jumping very far.

"We also advise producers to check different areas in the field. Make sure you have a representative counting of the whole field — to determine what the economic threshold might be," Lemus says. If grasshoppers are mainly in just one area of the field or pasture, it might not be worth trying to control them.

"I tell producers that if they see grasshoppers, they should determine their stage of growth, what type of crop it is and the growth stage of that crop. This will also be a factor in determining the best way to control them," says Lemus. Some products work best on immature grasshoppers, and on certain crops.

"If we have grasshoppers in Bahia grass or Bermuda grass and it is ready to harvest, you might not want to invest money in spraying," he explains. Compare the cost of control per acre to the current market value of that hay production. You don't want grasshoppers to eat up your profit, but you also don't want to spend more on control than what your profit margin might be.

"Most of the grasshoppers in the South lay their eggs in late summer and early fall. There may be some predators in those fields at that time that could reduce grasshopper numbers and keep some of them from becoming adults," says Lemus, referring to birds and other insects that eat grasshoppers or their eggs.

"There are many species of grasshoppers in the South, but usually only about four that are responsible for the damage we see. Find out which ones you have. If you are planning grasshopper control with a specific insecticide, read label recommendations for how to apply the product (rate of application and best application methods), as well as safety recommendations and restrictions regarding when you can put animals back into those pastures to graze or when you can cut the hay."

Most grasshopper damage is seen on severely dry years.

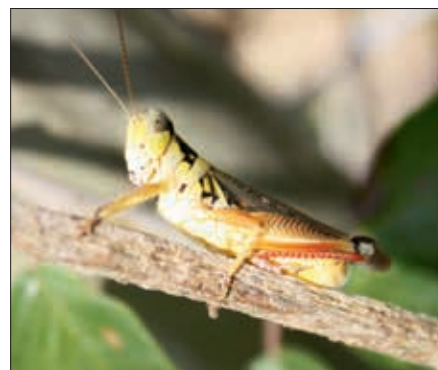
"With a wet summer and fall, many grasshoppers won't hatch or grow very well. A series of dry years might result in higher numbers because more grasshoppers survive to lay eggs that would hatch the next spring.

Adult females usually lay eggs in open areas like stubble fields or weedy pastures. A dry year with a lot of weed infestation provides good habitat for adult females to lay more eggs — with more grasshoppers hatching out the next year," says Lemus. If you know there could be a larger grasshopper population coming on, you could be ready to try to control them the next year.

There may be dozens of species of grasshoppers in any given ecosystem. Most years there is enough forage for them and for livestock and wildlife. If it's a dry year when



► **Above and below:** Grasshoppers have an external skeleton and can only grow to a certain size inside their current armor until it becomes tight. They have to split that old skeleton, get out, and form a larger, expanded skin. Through this repeated process they continue to grow toward adult shape.



PHOTOS COURTESY OF ROCKY LEMUS

forage is already short, some species of grasshoppers or crickets cause significant damage and economic loss, especially on rangelands.

Federal or state land management agencies, county and local governments, private groups and/or individual landowners can request assistance from USDA's APHIS to suppress those populations.

Control programs

Most government-assisted programs are

aimed toward arid western states. Bruce Shambaugh, grasshopper/Mormon cricket national operations manager and state plant health director for Wyoming for the USDA APHIS PPQ, oversees all PPQ programs in Wyoming. He also manages field operations for all grasshopper-Mormon cricket programs in the 17 western states.

"My job is to try for consistency in our field operations. There are variations from state to state because of differences in the land where these insects occur, and the people involved in



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these programs. Each state has evolved their own type of program. I try to make these as consistent as possible and still allow flexibility for what they need to do," he says.

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This information goes onto a map to help determine where to start looking the following spring. PPQ provides this information to all cooperators, stakeholders, land managers, Fish and Game employees, landowners, etc., so all invested parties can work together to manage the program for both grasshoppers and Mormon crickets. They all have a common goal to maintain a healthy rangeland ecosystem, he explains.

Spring surveys take their focus from what adult surveys showed the previous fall. Information received during meetings with landowner and cooperators during the year is also helpful.

"In areas where there are large stretches of private land, or public land with limited county road access, we might miss large areas, so we rely on landowners to know who to call when they notice a lot of grasshoppers," says Shambaugh. He recommends interested parties call the PPQ or a county weed and pest district, extension service or local land manager."

Young grasshoppers go unnoticed early in the year because they are so small — less than ¼ inch long, he observes. "We need landowners looking for young insects early in the spring. A person often has to get out and walk, or get down on hands and knees to look closely at the grass, to notice whether



PHOTOS COURTESY USDA APHIS

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there are one or two hopping, or 10 or 20."

USDA APHIS can do a survey if the rancher takes the first step in contacting the state plant health director.

"At the request of a private landowner we survey wherever they want us to, but we don't do this on our own," he explains, noting that many states have more stringent trespass laws. "We respect private land and don't go across it unless we have permission."

When it looks like there might be an impending grasshopper explosion with a lot of young insects in the spring, timeliness is crucial for suppression efforts.

"The largest challenge is to identify a high population quick enough for management decisions or suppression treatments, if it's the first year we know of it," says Shambaugh.

"This is why adult surveys in late summer are important, to help us identify what might be — or what might lead to — potential problems the next year or two. If we can do some planning, and get interested landowners coming to meetings over the winter, we can do an effective job on suppression treatments the next spring, but it takes

time to coordinate and get everyone on the same page. It's very difficult to do any suppression treatment if that population is just noticed or identified that year," he explains.

Brown says before USDA helps with a control program, it determines which species are present and in what numbers.

"Then we decide whether suppression efforts are needed. There is no absolute number for saying you don't need a treatment or you do need a treatment. Decisions are based on species composition and numbers. A rule of thumb: When the populations are several times what they normally would be, and it's a species capable of competing with livestock and moving to other areas, we give advice regarding treatments," says Brown.

"Treatments must be requested by the landowner or land manager, and our program will depend on land ownership. If it's federal land, the federal government pays 100% of the cost. On state land, the federal government pays 50% of the cost. On private land, the federal government will cover one-third of the cost," he explains.

The 17 western states are part of a federal survey program for grasshoppers and Mormon crickets managed by APHIS and administered through the PPQ program — with a mandate from Congress to do monitoring.

"Their mandate includes the suppression programs for other federal lands if a request is made and funds are available," explains Paul Blom, an entomologist with the Oregon



► Grasshoppers and Mormon crickets are integral to ecosystems, so control should only be used when they become pests and compete for livestock forage.

Department of Agriculture. “Here in Oregon, it’s most often needed for lands managed by the BLM (Bureau of Land Management), National Park Service and Bureau of Indian Affairs. For instance, we watch the Klamath Marsh Refuge closely because it has a perpetual grasshopper problem and sometimes conflicting interests (public and private). APHIS PPQ has made several targeted suppression efforts on the Refuge in recent years, requested by the Park Service. Here the Park Service works with their neighbors so the treatment on and off the Refuge can be coordinated.”

The federal agency works with local ranchers.

“Sometimes environmental groups get involved and with all these different interests (ranching, Refuge, environmental, etc.), management strategies and tactics become a hot political issue. Since grasshoppers don’t recognize boundaries, the Park Service tries to work with the local management efforts. If neighbors don’t control them, grasshoppers impact adjacent properties. It’s a regional problem that requires collaboration among private and sometimes public interests to be effective,” Blom says. Otherwise you might still have a grasshopper problem after spending money for control on your property, if they move in from adjoining lands.

“There are so many details, paperwork and regulations involved, however, that private owners often feel the complications required for support from the federal government is not worthwhile. If a person has to wait too long to start treatment, the grasshoppers have often matured and are no longer susceptible to optimal tactics. We’ve sometimes missed our window of opportunity because of a variety of technical issues and various public and private interests [that] caused delay,” he says.

Grasshopper density and species vary, and only certain species compete with livestock for forage.

“We used to have a migratory grasshopper in the U.S. It had its egg beds on the slopes of the Rocky Mountains. Through loss of habitat as settlement and development went up into the foothills, the numbers diminished and now we haven’t seen it for 30 or 40 years. This species was a severe problem because the population could build up and swarm over the plains in huge clouds, eating everything in its path.”

The grasshoppers we deal with today are not this bad, but they can be devastating in certain years.

“For instance, on the Klamath Marsh

Grasshopper biology

Paul Blom, an entomologist with the Oregon Department of Agriculture, says grasshoppers overwinter as eggs in the ground. Survival rates are affected by many factors: predators, parasites, pathogens, and the weather eggs endure as they overwinter and at the time they hatch.

“Extreme cold can affect viability of eggs over winter, but the greatest mortality can occur in the spring if they hatch and find nothing to eat. If it is wet, there could be plenty of forage, but extremely wet conditions can also foster pathogens, and they don’t thrive,” he says.

Landowners and land managers should pay attention during early spring, noticing where the hatch is and if there is a large number.

“Some species that tend to have large outbreaks will have fairly consolidated egg beds. The ground in those areas will be boiling with young grasshoppers,” says Blom.

“A species that is more diffuse in egg laying will still be noticeable if it is going to cause problems. The immature insects, specifically first instars, are very tiny, but you can see them if you look closely. In warm weather they may be moving around and easier to notice. In cool weather they may be immobile or hiding,” he says.

It is important to notice them early, when they are still together in groups after hatching. “That’s when producers can be most effective if control measures are needed, and won’t have to treat as large an area. If you use a chemistry that has some residual effect, early intervention can be important since the hatch will likely continue over a couple weeks,” says Blom.

There’s no guarantee that grasshoppers won’t move into your area later. Once they get to the third instar they are quite mobile. Insects progress through several stages of growth.

“They have an external skeleton and can only grow to a certain size inside their current armor until it becomes tight. They have to split that old skeleton, get out, and form a larger, expanded skin. Through this repeated process they continue to grow toward adult shape,” he says.

“The species in North America generally go through five immature stages (and some go through six) after the egg, finally becoming adults. The clear-wing grasshopper is probably our greatest bane in Oregon. When they hit the third instar, if the hatch is in high numbers, they start marching across the landscape, like Mormon crickets do, and become much more difficult to control,” he explains.

“You must use more inputs, and impact the environment more than if you had controlled them earlier,” Blom continues. “These are native species and part of our ecosystem. Even when they are not in outbreak numbers, grasshoppers eat a lot of forage, which for certain plants is the stimulus to help them grow. These insects are important for nutrient cycling in the whole system, and provide food for birds, animals and other insects. They are an integral part of the environment. All we want to do is keep them at a reasonable level so they are not economically competitive with our interests.”

Roger Gates, rangeland extension specialist at South Dakota State University’s West River Ag Center, says grasshoppers are cold-blooded, with body temperature the same as the surroundings.

“They control their body temperature by moving to a warmer or cooler area. If there are shady spots adjacent to bare ground, they can jump back and forth to control their body temperature. Grazing patterns and management that minimize bare ground can modify grasshopper population and slow their multiplication,” says Gates.

Only a few species are a problem for agriculture, he says. “There are about 70 species here in South Dakota and only 10 are potential pests. Some are grass feeders and some eat forbs, which also makes a difference.”

Species that cause problems in soybeans won’t be problematic to pastures, he adds.

“Grasshopper populations are analogous to drought, creating potential reduction in available feed supply. Producers need to anticipate both and have contingency plans. A good drought plan could also be applied to a grasshopper infestation,” he says.



► Instar stage grasshopper (left) adult female stage (right)

PHOTOS BY THOMAS SHAHAN, OREGON DEPARTMENT OF AGRICULTURE

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Refuge, one year while surveying in one of the nongrazing areas we found grasshopper densities of at least 300 per square yard — a marching carpet of grasshoppers. The grass was nearly a foot tall at that time, but when we came back a week later to set up a suppression program, all the grass had been eaten down to the crowns,” says Blom.

“In Lake County one rancher worked diligently with us because she knew the densities were about to reach outbreak proportions. With the local drought situation of the past few years, she said she couldn’t afford competition from the grasshoppers and wanted us to come survey. We did a fair amount of work on the ranch, and that fall

she told us it made thousands of dollars of difference on their forage.”

There are times strategic grasshopper control can head off a disaster.

“Often on private lands, it is actually easier and cheaper, however, if the owner does the treatment without involving us,” says Brown. “These are things we discuss with landowners regarding the options available.”

Then landowners have some idea of how to go about it, if they choose to do it themselves.

Lemus says that sometimes producers in the South can get financial assistance for grasshopper control on a bad year.

“Crop insurance may help, but in a severe

drought some of the USDA assistance programs may be activated. Cattle and forage producers might be able to assess how much damage they are suffering due to army worms and grasshoppers and be eligible for some of these programs,” he says. They need to work with their local extension agent to know what help might be available, or for advice on products to use and how to use them.



Editor’s Note: Heather Smith Thomas is a freelance writer and cattlemaster from Salmon, Idaho.

Control methods

“Rotational patterns that create more uniformly shaded areas (not grazing forage down to the ground) are a good practice to help mitigate grasshopper populations,” says Roger Gates, rangeland extension specialist at South Dakota State University’s West River Ag Center. On public land it can be difficult to practice adequate rotational grazing or grasshopper control, however.

“Working with agency people to make plans for long-term health of the range can be a start, but nothing happens fast on public lands,” Gates warns.

By the time everything is in place for a control program, the best window for controlling an exploding grasshopper population — when they are young and not expanding their territory yet — may be past.

“If numbers are sufficiently high to put producers at risk, there are cost-share programs that are 100% on public land (and one-third on private land). It’s important to try to anticipate what happens the next year. One of the big costs of control is application since a lot of it is done with aerial spray,” says Gates.

If neighbors are willing to work together so large areas can be treated, it reduces cost for each individual and also reduces the risk for grasshoppers coming into your place from a neighboring ranch that did not control their hoppers. It pays to plan ahead and to have an organized effort.

Brown says there are three different insect treatments that can be used, but most common is an insect growth regulator called Dimilin (diflubenzuron). This chemical affects the external skeleton; young insects can’t continue their growth — and die. It must be applied early in the season, when grasshoppers are still young enough to be growing.

Paul Blom, entomologist for the Oregon Department of Agriculture, says this product has residual action for almost three weeks.

“It can give 80% to 85% effective control of grasshoppers if applied when they are in the first or second instar,” Blom explains. “By the time they have grown to the third or fourth instar, they have moved around enough to encounter treated areas, consuming enough to be killed.”

Most of the other insects are not affected by the chemical, he says.

The product targets chewing insects that eat the sprayed foliage. “Once the grasshoppers get it in their system, it interrupts their ability to make chitin, which is an important component for the external skeleton. At the next molt, they fail to develop a viable skeleton and can’t survive. This growth regulator is not completely

selective, but more selective for grasshoppers than other products,” he says.

“Other treatments available are insecticides called malathion and carbaryl,” says Brown, adding that carbaryl is very effective as a solid bait, especially against Mormon crickets.

“They are attracted to the bait pellets and eat them,” he notes. “The bait is spread out where they are, or where they are headed. If Mormon crickets are the majority of the insects in the area, they reach the bait first — before the non-targeted insects would be likely to

find it. The crickets completely consume the pellets.”

There are two methods of application — by plane, spraying the bait over the land, and by ground equipment, such as an ATV. Choices will depend on terrain and individual situation.

When applying treatment, Brown typically uses a skip-swatting approach called Reduce Agent Area Treatments (RAATS).

“We spray a swath and skip a swath; every other swath is treated,” he explains. “This reduces the amount of insecticide used, and is effective because grasshoppers and crickets move. If they are in one of the untreated swaths, they eventually move into one of the treated areas while traveling.”

The goal with treatment is to reduce outbreak levels to levels of a normal year, Brown says. There would be fewer eggs laid, which would mean less explosive numbers the next year. The effects would hopefully last for a year or two afterward.

Not every outbreak needs to be suppressed. Many years, there might be enough forage for both the insects and the cattle. On drought years, however, it may be a tough situation for stockmen when the insects eat most of what is available.

Timing is crucial for the insect growth regulator. It doesn’t have any efficacy on adults. The window for this treatment is much shorter than for insecticide options. The growth regulator is the preferred choice because it is more environmentally friendly and doesn’t adversely affect as many non-targeted species.



PHOTO COURTESY USDA APHIS

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