Q&A: Grasshopper Pest Management in Cropland

Tyler Lane answers questions about grasshopper identification, monitoring, and control.

Why did we see high populations of grasshoppers in Montana in 2020?

Favorable weather conditions have promoted grasshopper pest populations. In 2019, a cool, wet spring delayed hatching, and then warm weather moved in without additional cool, wet weather, which resulted in a high percentage of hatch survival rates later in the season. In addition, vegetation was highly productive in 2019, especially sweet clover. As a result, grasshopper populations grew without being noticed or managed.

Why should I be concerned in 2021?

A dry summer in 2020 and an open fall promoted high egg laying which will result in large hatches in 2021. If a drought continues in Montana, populations will continue to increase. Grasshoppers are a boom and bust species. As long as we have arid conditions, populations will continue to increase.

What about the cold weather last winter? Wouldn't below zero temperatures affect egg survival rates?

The answer for 2021 is probably not. In Canada, few grasshoppers hatched following a winter with temperatures at negative 22° F. However, Canada had little snow cover during the time period when mortality occurred. Snow cover generally reduces the impact of cold temperatures on below-ground overwintering insects.

Will a wet spring break the cycle?

The answer is yes if timed correctly with hatches. Prime conditions for decreasing populations begin with warm, early springs followed by a hot period, followed by a minimum of one week of cloudy, wet weather. Warm, early springs promote embryo development. A hot period in early spring promotes hatching and one week of cloudy, wet weather promotes fungal pathogens on grasshoppers.

When should I start monitoring for grasshoppers?

Begin on May 1. The grasshoppers of most concern (Two-striped, Migratory and Packard) usually hatch close to May 15. Another monitoring rule of thumb is that embryos will continue development when the soil temperature rises to 50-55 degrees Fahrenheit. Eggs will typically hatch 14 days later.

I saw grasshoppers long before the soil temperature reached 50-55 degrees. Should I be concerned?

The answer is most likely no. There are a handful of grasshopper species that overwinter as adults and are not considered harmful. Catch the grasshopper and determine if it has wings. Winged grasshoppers are adults that have overwintered and will not cause any harm to the crop.

How do I monitor for grasshoppers?

Visualize a square-foot area from a distance and count the number of grasshoppers jumping out. Divide the number of grasshoppers by the number of areas counted and multiply by nine to estimate density per square yard. Be sure to completely disturb the square foot area because first and second instar nymphs often will not jump.

Is it true that the migratory grasshopper is often the most harmful species to cereals?

Yes, it can travel very long distances, destroy seedlings, defoliate crops throughout the growing season and clip cereal grain heads before harvest.

How do I tell a harmful grasshopper from a non-harmful grasshopper?

Many spur-throated (having a spine on

the throat area) grasshoppers are harmless, but a few species, like the Two-striped and Migratory are major pests of cropland. Slant-faced grasshoppers are slim and pointed in profile or they have disproportionately large heads, and lay too few eggs to be harmful.

What are yield damaging levels for grasshoppers?

Thresholds for managing grasshopper pests in spring wheat are used for alfalfa and dry beans. Lentils are very susceptible to adult grasshoppers because they can clip the pods. The action threshold for lentils is only two grasshoppers per square yard in flowering to pod stages. See Table 1.

I have heard about diflubenzuron (Dimilin®). Why is it so highly recommended for grasshopper control?

Diflubenzuron is active for 30 days, has a low toxicity to mammals, and provides some safety to beneficial insects.

How does diflubenzuron work?

Diflubenzuron interferes with formation of a grasshopper's exoskeleton, which leads to loss of body fluids. Maximum control usually is achieved in 10-14 days. If a large influx from neighboring fields should occur, the time to reduce that population may not be short enough to minimize extensive foliage feeding; a tank mix with a knockdown insecticide is recommended under these conditions. Diflubenzuron can be mixed with the knockdown insecticide to provide 30 days of crop protection.

When do I spray diflubenzuron?

It is important to apply diflubenzuron when grasshoppers are second to fourth stage nymphs, which is when they measure about three-fourths of an inch in length and do not have fully-formed wings. Diflubenzuron is not effective on adults. When in doubt, always refer to the product label.

What would be a good step-by-step management order if grasshoppers continue to exceed economic threshold levels?

First, spray grass borders and neighboring rangeland at beginning of egg hatch using diflubenzuron. Second, use diflubenzuron on field borders (a minimum of 150 feet). Lastly, spray contact insecticides if populations exceed economic threshold. Be sure to rotate insecticide groups to prevent resistance. Remember, diflubenzuron can be mixed with the knockdown insecticide to provide 30 total days of crop protection.

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Immatures/yd²			All Montana Spring Crops and Alfalfa	Adults/yd²			All Montana Spring Crops and Alfalfa
Rating	Margin	Field	Treat?	Rating	Margin	Field	Treat?
Safe	<25	<15	No	Safe	<10	<3	No
Light	25-35	15-25	No	Light	10-20	3-7	Yes, if there is a potential for head clipping
Threatening	50-75	30-45	Depends on prices and crop condition	Threatening	21-40	8-14	Yes, if there is a potential for head clipping
Severe	>100	>60	Yes, monitor for retreatment	Severe	>41	>15	Yes, consider wider border treatments and monitor for retreatment

Courtesy of Kevin Wanner