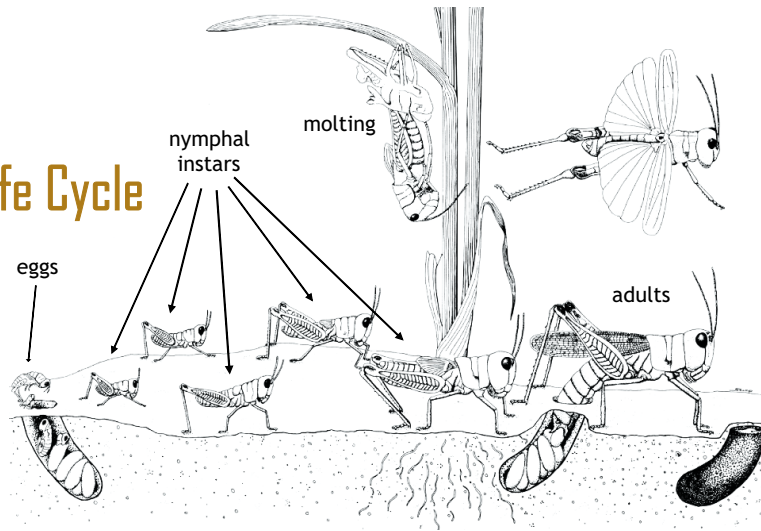


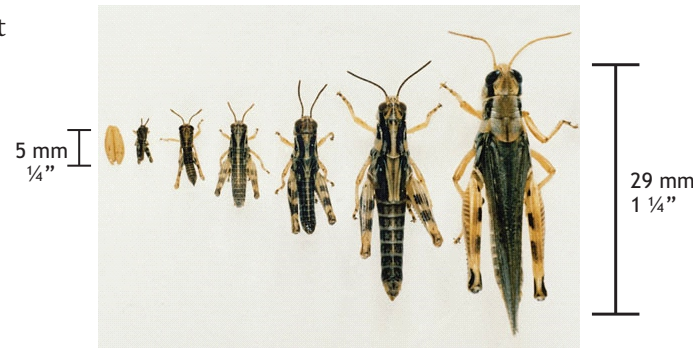
# General Biology

- Eggs are laid in pods, 5-30 eggs per pod depending on species during the summer and are the overwintering stage. A few species in Montana over winter as nymphs (immature grasshoppers) but aren't pests.
- Nymphs develop through five instars before becoming adults. Only the adults have wings. Nymphs and adults can cause damage. Nymphs take 30-40 days to develop; adults live 40-60 days.
- A few species overwinter as nymphs, using antifreeze compounds to stay alive. They become adults by late spring, but don't cause economic problems.
- Grasshopper species vary in what they eat, with some generalist species eating a wide range of grasses and flowering plants while specialists eat only a few species of plants.

## Life Cycle



## Instars of a Major Pest Species



*Melanoplus sanguinipes*

# Weather Effects

## Direct and Indirect

### Sunny and Dry

- Faster development
- Less susceptible to diseases
- Lower mortality
- More eggs produced IF quality forage is present

### Cool and Damp

- Slower development
- More susceptible to diseases and natural enemies (?)
- Higher mortality, fewer eggs laid
- Higher forage production, so plenty of food for cows AND grasshoppers

## Some Economic Thresholds for Small Grains

Treatment guidelines for small grains based on number of grasshoppers (nymphs and adults) per square yard.

Grasshopper Population	Field	Field Margin	Treatment necessary?
Non-economic	0-2	5-10	No
Light	3-7	11-20	Questionable, depends on size, species, type of crop
Moderate	8-14	20-40	Probably
Abundant	15 or more	41 or more	Yes

Thresholds are lower for winter wheat, light populations may require treatment

## For More Information:

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**USDA-ARS Northern Plains  
Agricultural Research Laboratory**

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# GRASSHOPPER OUTBREAKS

HELPFUL TIPS FOR IDENTIFYING  
PROBLEM SPECIES AND  
WHEN TO TAKE ACTION\*

\* Developed from a March 29, 2022 workshop featuring speakers from USDA-ARS, Sidney, MT; USDA-APHIS, Billings, MT; and MSU-Extension, Bozeman and Sidney, MT. More information found at: <https://ars.usda.gov/grasshopper/>

U.S. Department of Agriculture  
Agricultural Research Service



USDA-ARS Northern Plains Agricultural Research Laboratory

# Grasshopper Subfamilies and Common Pest Species

Of the 100 or more species of grasshoppers in the Northern Great Plains, fewer than a dozen are of economic importance. Grasshoppers species can be grouped into three subfamilies, with most problematic species in the spur-throated and slant faced groups.

## Spur Throat Subfamily

- Most prominent grasshoppers by abundance, diversity and ability to feed on both grasses and flowering plants.
- Several economically damaging species to both rangeland and crops
- Often nondescript looking
- **Common pest species:** Migratory grasshopper (typically the #1 pest in our region), Two-striped, Differential, Red-legged and Largeheaded grasshoppers



Migratory grasshopper; the #1 pest in the region

## Slant Faced Subfamily

- Some economically damaging species, largely grass feeders
- Males “sing” to attract females by rubbing pegs on their femurs on outer wings to produce sound
- **Common pest species:** Whitewiskered, Bigheaded, Obscure grasshoppers



Slant faced grasshoppers are largely grass feeders

## Band Winged Subfamily

- Colored wings signal they are NOT pest species.
- Many snap hindwings as they fly and can be heard across a field
- **Common pest species:** Clear-winged grasshopper, not common in our region



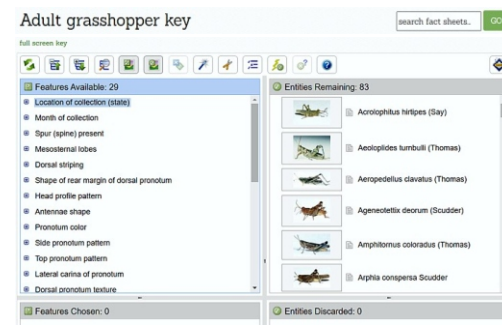
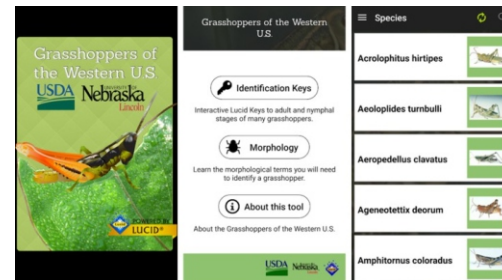
Colorful winged species are typically not pests.

## Available ID Resources

Grasshoppers can be hard to identify, and some species may not be a risk for adjacent crops based on what they prefer to eat. The Sidney MT ARS lab hosts a robust grasshopper website with extensive information on the biology, ecology, identification and management of grasshoppers in North America.

<https://ars.usda.gov/grasshopper/>

*The Grasshoppers of the Western U.S. Lucid mobile app for Android and iPhone offers keys to easily identify both adult and pre-adult stages of grasshoppers commonly found in the western U.S. Links to the apps are on the Sidney, MT ARS grasshopper website.*



Sample pages

# Grasshopper Outbreaks and Rangeland Impacts

- Outbreaks: Made up of 2-6 of approximately 80 rangeland species, which differ in what plants they eat.
- Economic problems for ranchers increase during droughts when grass production is low.
- Rangeland forage losses of \$1.7 billion/year.
- Grasshoppers can eat more than cows when abundant, and can also weigh more per acre!

- Twenty nymphs per square yard may destroy as much forage as a 1000-lb. steer would eat.

## Hoppers Not All Bad

Grasshoppers can have beneficial roles at low to moderate densities:

- Important food source for many grassland birds and game birds
- Can increase rangeland productivity through nutrient cycling

# Risk Assessment for Ranchers: What to Look Out For

*Late summer forage condition?*

- Grasshoppers need protein and at least some green vegetation. Outbreaks can rapidly crash when forage quality is poor in late summer.

*Did hopper numbers remain high into late summer?*

- Egg laying occurs in late summer and early fall, where are grasshoppers located during this time?
- Are late summer and fall weather conditions warm (higher risk) vs. cool (lower risk)? Grasshoppers need heat and food to lay many eggs. When cool they may stay alive but less egg laying occurs meaning a lower outbreak risk for the next year.

*Areas with high late summer densities are where high hatching could occur:* Frequently look for small hatchlings (1/8-1/4”) or you may lose most of your forage before spraying.

## Scouting / Survey Tips

*Late May – Early June*

Scout early for nymphs - Think small, 1/8 to 1/4-inch in size. Identify areas of high density, hatching beds.



*August – Sept*

Locate egg-laying sites

## Conducting Surveys

- Visualize a square foot ahead of you on the range and walk toward it
- Count the number of grasshoppers that jump out of the square
- Repeat 18 times; divide the total by 2
- Gives total grasshoppers per square yard

## Do I Treat? Some Considerations

- > 15 grasshoppers per square yard?
- Is there grass to save? (drought)
- Should I just buy hay?
- Can I wait for mother nature?
- Best time to treat: 2nd – 4th instar, after all the eggs have hatched but before the adults begin flying and dispersing.
- Consider Reduced Area and Agent Treatments (RAATs) (*more info on Sidney, MT ARS website*)