Grasshopper Life Cycle

Western grasshoppers produce only one generation per year.

1. **Hatching usually occurs mid-May to late June.** A few species hatch in the summer and overwinter as nymphs.
2. **Grasshoppers have to shed their hard exoskeleton to grow bigger through each nymphal stage (instar) to adulthood.** They often hang upside down on grass stems to molt. It takes five to seven days to complete an instar.
3. **Most species have five nymphal instars.** The last molt results in an adult with functional wings that allow for escape flights. Some species have longer durations.
4. **Only mature adults can reproduce, so egg laying is prevented if nymphs are treated.** Adult females require 2–3 weeks to reach reproductive maturity, after which they produce 20 to 100 eggs in several clusters or pods deposited in the soil.
5. **Eggs are resistant to cold and desiccation, but they are vulnerable to parasites (tiny wepies, flies, and blattid beetles).** Birds and other predators feed on eggs and adults and also help keep grasshopper densities in check.

### How to use ATV/RAATs

1. **Apply atrazine with 20% or less in both 14 and 33 ft wide swaths.** One option is to use a constant flow output, typically 1 gallon per minute (GPM). One way to increase accuracy and minimize drift is through the CARMA software that is based on one of the following DVDs:

   - **GPS:** High accuracy, fast speeds, and remote operation.
   - **V携:** Low speed, accurate placement, and variable coverage.

2. **Use a 12-foot wide swath at a rate of 34 GPM.** This rate will result in a coverage of 50–75%. RAATs mean 50 to 75% less insecticide is applied to rangelands.

3. **Determine the extent of the infestation.** This will require travel by truck, ATV, or foot as conditions may need to brush it with your hand or foot to make sure the grasshoppers are present in the area. Once you have reached the site, you will need to verify the presence of the grasshoppers by looking for them in the area.

4. **Carry out an aerial treatment.** Use a constant flow output, typically 1 GPM per treated acre. Alkaline water (pH>8) used for carrier fluid should be buffered to neutral pH to prevent degradation of the insecticide (e.g., malathion), which can be stored successfully for a year.

5. **Apply the insecticide to the infested area.** The aerial spraying method is typically used to control grasshoppers in large areas. The unaffected areas are treated by ground application. The insecticide is applied to a swath that is either 12 or 14 ft wide. The swath is then treated using an appropriate number of nozzles to achieve the desired coverage.

6. **Apply the insecticide to the infested area.** The aerial spraying method is typically used to control grasshoppers in large areas. The unaffected areas are treated by ground application. The insecticide is applied to a swath that is either 12 or 14 ft wide. The swath is then treated using an appropriate number of nozzles to achieve the desired coverage.

### Step-by-step Guide to Deal With a Grasshopper Infestation

1. **How to evaluate grasshopper density**
   - **Reason:** It is important to accurately estimate grasshopper population density before designing an appropriate treatment plan.
   - **Method:** The most commonly used method to accurately estimate grasshopper population density is a rectangular area method. This method involves counting the number of grasshoppers within a defined area and extrapolating this number to the entire infested area.

2. **How to use ATV/RAATs**
   - **Reason:** ATV/RAATs mean 50 to 75% less insecticide is applied to rangelands. This will result in a coverage of 50–75%. RAATs mean 50 to 75% less insecticide is applied to rangelands.
   - **Method:** The most commonly used method to accurately estimate grasshopper population density is a rectangular area method. This method involves counting the number of grasshoppers within a defined area and extrapolating this number to the entire infested area.

3. **How to evaluate grasshopper density**
   - **Reason:** It is important to accurately estimate grasshopper population density before designing an appropriate treatment plan.
   - **Method:** The most commonly used method to accurately estimate grasshopper population density is a rectangular area method. This method involves counting the number of grasshoppers within a defined area and extrapolating this number to the entire infested area.

4. **How to use ATV/RAATs**
   - **Reason:** ATV/RAATs mean 50 to 75% less insecticide is applied to rangelands. This will result in a coverage of 50–75%. RAATs mean 50 to 75% less insecticide is applied to rangelands.
   - **Method:** The most commonly used method to accurately estimate grasshopper population density is a rectangular area method. This method involves counting the number of grasshoppers within a defined area and extrapolating this number to the entire infested area.

5. **How to evaluate grasshopper density**
   - **Reason:** It is important to accurately estimate grasshopper population density before designing an appropriate treatment plan.
   - **Method:** The most commonly used method to accurately estimate grasshopper population density is a rectangular area method. This method involves counting the number of grasshoppers within a defined area and extrapolating this number to the entire infested area.

6. **How to use ATV/RAATs**
   - **Reason:** ATV/RAATs mean 50 to 75% less insecticide is applied to rangelands. This will result in a coverage of 50–75%. RAATs mean 50 to 75% less insecticide is applied to rangelands.
   - **Method:** The most commonly used method to accurately estimate grasshopper population density is a rectangular area method. This method involves counting the number of grasshoppers within a defined area and extrapolating this number to the entire infested area.

7. **How to evaluate grasshopper density**
   - **Reason:** It is important to accurately estimate grasshopper population density before designing an appropriate treatment plan.
   - **Method:** The most commonly used method to accurately estimate grasshopper population density is a rectangular area method. This method involves counting the number of grasshoppers within a defined area and extrapolating this number to the entire infested area.