



# Nolo Bait™ Biological Insecticide

## What is Nolo Bait™?

Nolo Bait is biological insecticide registered with the Environmental Protection Agency (EPA) for use on 58 species of grasshoppers, locusts and some species of crickets. Unlike chemically-based insecticides, Nolo Bait contains a naturally-occurring spore called *Nosema locustae* that infects grasshoppers. The disease that results from this infection is activated once the spore is ingested by grasshoppers.

To enhance ingestion by grasshoppers, the spore is applied to a large flaky wheat bran carrier. Most pest species of grasshoppers, particularly younger instars (developmental growth stages), are naturally attracted to wheat bran when they are actively feeding. The resulting infection aids in the suppression of grasshopper populations without damaging the environment.

## How is Nolo Bait formulated?

Concentrated *Nosema locustae* is uniformly applied to flaky wheat bran at the guaranteed rate of at least one billion microscopic spores per pound of the carrier. It is packaged in one-pound and five-pound containers and ten and fifty pound bags. Once formulated, Nolo Bait shelf-life is approximately 13 weeks. Be sure to store it in a cool, dry place.

## How does Nolo Bait work?

A grasshopper ingests one flake of the bran formulation and becomes infected. The spore is activated once it reaches the mid-gut of the grasshopper, germinating like a seed after planting. The subsequent infection of the grasshopper's vital system can ultimately cause death. While infected, and sick, the insect eats less and less, thus reducing loss of vegetation. In a period of 3 to 4 weeks, up to 50% of the infected grasshoppers will die of Nolo Bait ingestion. Other grasshoppers, while not dying, will be infected, spreading the disease throughout the healthy population.

Unlike conventional chemical applications which control only on contact, *Nosema locustae* will continue to spread in two ways:

1. Infection and self-destruction are aided by grasshoppers' cannibalistic nature. As uninfected individuals eat their fallen comrades, they too become infected and fall victim to Nolo Bait.
2. Infected females pass the disease by the laying eggs, thus exposing future generations of offspring to the effects of *Nosema locustae*. This infection process suppresses populations, providing long-term benefits to ranchers and farmers.

## How do I apply Nolo Bait?

For large acreages, Nolo Bait is supplied ready for aerial or ground application. For smaller, hard-to-get at areas, Nolo Bait can be safely applied by hand with no special equipment. The objective in applying Nolo Bait is an optimum coverage of the product. At a minimum recommended rate of one pound per acre, approximately 25 flakes per square foot will be visible. Multiple applications may be needed where grasshopper populations are concentrated.

### *For lawn and garden*

Hand broadcasting is suitable for small areas. Apply the product as thinly as possible. Concentrate on areas where grasshoppers are heaviest. The pest must ingest the treated bran in order for Nolo Bait to be effective.

### *For large acreage applications*

Nolo Bait can be applied effectively by aircraft equipped with dry spreaders. The Animal and Plant Health Inspection Service (APHIS) has researched modifications required for aerial application of flaky bran baits.

Any dry flow applicator will adequately disperse Nolo Bait, providing the hopper feed mechanisms can be closed down to a small opening and agitation devices in the hopper are used to reduce bridging or pulverizing of the flaky wheat bran. Applicators can be mounted on tractors, pickups, ATVs, or other vehicles. Consult your operator's manual for calibration instructions.

## **ATVs - All Terrain Vehicles**

Several companies manufacture spreaders that mount on ATVs. They are appropriate for bran bait application. Refer to calibration directions supplied by the manufacturer.

## **Pickups/trailers/trucks**

Larger spreaders can be mounted on a pickup, a trailer, or on a tool bar for tractor application. Refer to manufacturers' guidelines for calibration directions, swath widths, and mechanical feeding devices. Measures must be taken for bran bait to feed uniformly from the hopper into the spreading mechanism.

## **When do I apply Nolo Bait?**

As few as eight grasshoppers per square yard is considered economically endangering to rangeland. Nolo Bait is most effective when applied during the early morning hours in areas where grasshoppers will actively feed. Application is not recommended when daytime temperatures are expected to be below 60 degrees F (16 degrees Centigrade) or during rainy weather. Grasshoppers do not feed actively during cool, cloudy or rainy weather. Delay application of Nolo Bait if rain is threatening.

During hot, dry periods, grasshoppers can consume all of the wheat bran flakes in as little as four hours. Application during the morning hours usually allows adequate time for Nolo Bait to be consumed before potential afternoon thunderstorms.

Early application of Nolo Bait to second and third instar ( $\frac{1}{4}$  to  $\frac{1}{2}$  inch) grasshopper hatching areas is best, before the pest can move over a larger area of terrain. Sandy soil and south-facing slopes will attract heavier concentrations of egg-laying females. This makes for a prime hatching bed. Also, roadside rights-of-way, fence lines, and drainage areas that remain green as rangeland browns out can be prime hatching areas.

## **How do I develop a strategy for control?**

Nosema Locustae requires time to infect large populations — up to three weeks or longer for widespread suppression. Consider this delay when planning a program for total crop or rangeland protection.

Long-term suppression can be achieved by applying Nolo Bait treatments in grasshopper

inhabited areas, hatching sites, or around the perimeters of an insecticide-treated zone. This buffer zone will help create a population of diseased grasshoppers that will continue to spread the infection to later hatches and to migrating hoppers.

If grasshopper numbers are high enough to cause significant damage in three weeks, consider an integrated control strategy. Nolo Bait is compatible with insecticide baits or with sprays if an immediate knockdown is required.

Alternating swaths of Nolo Bait and carbaryl bait (or other insecticide) provides both knockdown and long-term suppression of heavy infestations. Stripping Nolo Bait in hatching beds and reserving insecticides for crop margins is another integrated strategy. A note of caution: This alternating swath strategy will not provide the percentage of knockdown achieved with full chemical coverage; however, the disease will spread into the insecticide-treated strips for optimum infection and long-term effect.

Always treat areas that historically have infestations. Grasshopper outbreaks can be greatly reduced if prime survival beds are inoculated with *Nosema locustae*.

## **How should I treat environmentally sensitive areas?**

Some areas are not suitable for application of chemical insecticides. To protect birds, fish, various wildlife and non-target insects, use Nolo Bait exclusively. Nolo Bait has no restrictions around bodies of water and can be used up to the water's edge, as directed by EPA regulations.

Nolo Bait is not harmful to humans, livestock, birds, game animals or other insects, crops, or water resources.