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SLAM Beetles & Protect the Environment

Low-rate bait insecticide for rootworm beetles opens new horizons for Corn Belt applicators.

by Ron Butler

Gimme caps, planes, regulations, trucks, trends and even growers may change from year to year in the Corn Belt, but one thing doesn't: When the tip of an ear of corn sprouts silks, rootworm beetles pop out of the ground to eat them, mate and lay eggs for next spring's root feast.

There may be more Western Rootworm Beetles than Northerns or vice-versa. They may come out in greater numbers some years. They may even be a little early or a little late. But they'll be there. And if they turn out in populations that cross economic thresholds, the grower is going to have a problem.

Above, the Western Rootworm Beetle. Left, the Northern Rootworm Beetle.

This year, the launch of a new low-rate bait insecticide has meant aerial applicators can offer growers the best range of rootworm beetle control strategy options yet. The bait concept has opened new income horizons for some applicators. For others who have long advocated adult control of rootworm instead of soil insecticides, there's a stronger environmental argument with the low-rate bait.

"The bait approach that SLAM represents is going to fit very nicely in this area," said Tom Thomas, president of McCool Air Service, a three-plane operation that treats about 70,000 to 100,000 acres a year near McCool Junction, 50 miles west of Lincoln, Nebraska. "We have 90 percent continuous corn here and a lot of growers don't use soil insecticides. Instead, they're on our adulticide program for beetles. By scouting the fields and spraying the beetles before they lay eggs, we can keep rootworm problems below manageable economic levels. Some of these growers are more than happy not to use soil insecticides because of environmental concerns.

"SLAM is going to be a great addition to our program because it works, it's low-rate, and it's good news for beneficial insects and people who have to mix, load or handle it."

THEY CAN'T RESIST IT.

The bait in SLAM is "cucurbitacin," a compound rootworm beetles are genetically programmed to eat whenever they encounter it. A "microsphere" formulation binds a trace of carbaryl with the cucurbitacin. The result is a lethal bite-sized gumball rootworm beetles can't resist and that easily goes into suspension and through spray equipment.

The recommended rate for SLAM is 1/4 to 1/2 pound per acre, diluted with

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Applying SLAM at one gallon per acre, Egeberg's Pawnee can cover plenty of territory.

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water for a minimum of 1/2 to 1 gallon finished spray per acre. Only about 0.7-ounce of carbaryl is in a half-pound of SLAM. That's less than is usually found in a flea collar for pets and 97 percent less toxicant than carbaryl WP alone at the 2 pound/acre rate. The dermal toxicity for persons handling the bait insecticides is much lower than with most other options.

USDA and university tests showed that in corn SLAM can eliminate up to 98 percent of rootworm beetles within two hours, yet isn't active on beneficial insects such as lady beetles and lacewings. Nor is SLAM active on birds or bees.

"We've been using a good, cheap product, but it's been hard on the bees, so that's just one way SLAM will fit in," said Thomas. "Overall, it's going to open new business for us as people become familiar with it."

After SLAM's registration came through late last summer, Thomas got enough for a quick application on about 100 acres, and it did an excellent job of handling a "terrible outbreak" of rootworm beetles, surprising many growers.

"It's going to be great stuff. I like the idea of lower toxicity – it's going to help take away some of our liability problems. And we had no problem mixing or spraying it.

"We're going to use more of it, talk with some new growers, and work it into our usual two-spray program," Thomas said. "If there are no corn borers around, we'll probably go twice with SLAM. If there is borer, we'll use SLAM the first time and something more broad spectrum the second. Unfortunately, the others tend to kill beneficials like lady-

***Gary Egeberg** has a lot of experience with rootworm problems in his 20 years of spraying around Brookings, South Dakota.*

bugs and lacewings."

A 1992 study at the USDA Agricultural Research Service's Northern Grain Insects Research Laboratory at Brookings, South Dakota, showed zero mortality among lady beetles and green lacewings exposed to SLAM in a caged study.

To Harold Miller, president of Harold's Flying Service, that's a strong suit for SLAM. He runs a 10-plane company that operates in several states from headquarters in Leland, Illinois. "Two of the most important things SLAM has going for it are, first, cutting down on the potential loss of beneficials and second, the perception by the population that this is in fact much safer for the environment," he said. "We're all interested in protecting the environment. And in the long run, it's a very important issue that not only are we protecting the environment, but that we're *perceived* as protecting the environment."

RESULTS COUNT.

Above all, any new crop protection strategy has to be effective, and Miller is convinced.

"We were able to get in some test work with it last summer, and the results were very good," he noted. "On nearly 400 acres, a lot of it seed corn acreage, there was no measurable difference in control between SLAM and the regular carbaryl."

That's good enough for the bait concept to earn a spot in Miller's operation, where adult rootworm control has long been advocated:

"The long-term trend is to get away from soil insecticides. Most farmers are concerned enough about the environment they don't want to cause any damage. If there is an alternative, they'll use it. It just takes time to get them to switch.

"I prefer this prescription type of program, where you go out and cure a problem when you have a problem instead of the soil insecticide approach of putting on the protection prior to even having a problem."

EASY TO USE.

Around Brookings, South Dakota, where Gary Egeberg has been applying aerial crop protection about 20 years, it seems there's always a rootworm problem somewhere nearby, and growers need a fast, simple response.

"These corn rootworm beetles love the bait material, and within 20 minutes of spraying, they're already eating it and

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Best Ways to Work SLAM

Several tips on how to get the best performance from a SLAM application have been developed from the experiences of ag pilots who worked with the product in 1993.

- *Make certain mixing and spray tanks are flushed out.*
- *Maximize spray droplet size. That's more important than coverage.*
- *Use a polyvinyl deposition agent.*

SLAM is a bait, which means its taste, aroma and texture are of critical importance to the target insects. When working with SLAM, don't inadvertently mask or change those characteristics, suggested Dr. J. Derril Munson, Development Manager for MicroFlo.

"Rootworm beetles won't feed on just anything – it has to be the right bait in the right size with the right amount of toxicant," he said. "At this time, mixing SLAM with any other pesticide is not recommended. Even residual amounts of another pesticide can cause problems."

During the 1993 spray season, some applicators failed to flush the last couple of gallons of broad-spectrum insecticide out of their tanks before taking on a load of SLAM, Dr. Munson noted. When the two mixed, the result was that SLAM's bait characteristics were masked and effectiveness was reduced.

BIG DROPS.

Another characteristic of a bait is that you don't have to hit the beetles on the head with it. They'll sense it and go after it. That means a fine, even coverage is less important than nice big, irresistible droplets well dispersed over the crop.

"We've found it's better to optimize droplet size," said Dr. Munson. "You should minimize droplets of 700 microns or less.

"Water volume of 0.5 to 2 gallons per acre does not affect SLAM's performance if droplet size is optimized. You'll want to adjust spray pressure and orient nozzles to avoid droplet break-up."

Non-pattern producing nozzles or straight stream nozzles, such as the disc and core types, work best. Remove the cores to increase droplet size, Dr. Munson suggested.

The recommended nozzles are the D-15 or a CP nozzle with a 0.172 orifice size. To attain a minimum of a half-gallon spray volume at 15 to 20 PSI, the number of operative nozzles should be cut back to two on each wing for a 50-foot swath or three on each wing for a 70-foot swath. If a deflector is used, set it for 30 degrees.

Or, follow this formula for number of nozzles needed.

1. *Determine the Acres Per Minute.*
   (APM = M.P.H. x Swath Width divided by 495)
2. *Determine the Total Gallons Per Minute.*
   (TGPM = APM x Gallons Per Acre Requested)
3. *Determine Nozzles Required.*
   (TGPM divided by orifice of choice with desired pressure = Nozzles Required)

DEPOSITION AGENTS HELP.

Use polyvinyl deposition agents (also known as "drift control" agents) to improve management of droplet size. Polyvinyl polymers or polyacrylamides do not interfere with the rate or speed of beetle feeding and mortality, but they do increase droplet size and rainfastness, noted Dr. Munson.

"Again, the goal is to regulate the droplets. We also have seen some improvement in rainfastness with these deposition agents," he said.

A considerable amount of research with deposition agents has accumulated in recent years, especially from work published by the American Society of Agricultural Engineers, Texas A&M University, the University of California at Davis, the University of Illinois at Urbana, and the University of Missouri, Dr. Munson said.

Any of several of the deposition (or drift control) products currently marketed should work well with SLAM, "but the ones that work best have less solvent and higher concentrations of active ingredient," he added.

University studies show drift control agents can increase deposition of product reaching the crop as much as 33 percent, reducing evaporation or vaporization as well as increasing droplet appeal for the beetles.

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already dying from it – so it's very quick acting. It's in the higher 90s for percent of kill.

"SLAM is probably one of the easiest insecticides I've ever had the opportunity to apply," Egeberg noted. "We just measure out what we want, and slowly pour it into the water as it agitates. And it goes right into suspension. As we're emptying the tank into the airplane, then we'll use our garden hose to get the last little bit out.

"I have two 20-mesh screens in my mixing tank and I've had no problems plugging at all. I've taken the screen out of the airplane. I'm mixing it one gallon finished spray per acre, so with one of my planes I can easily go out and do 100 to 110 acres. With the other airplane I can do 160 acres."

Developed by the MicroFlo Company of Lakeland, Florida, SLAM's microspheres (patent pending) look a little like some dry flowables. "But SLAM is quite different because microspheres don't dissolve," said Keith Branly, MicroFlo vice president of Research and Development.

"Dispersants and surfactants not normally found in agricultural formulations are used," he said. "They offer a low level of risk to applicators and make possible a high level of active ingredient in a tiny particle.

"SLAM was formulated so it requires no special pods or equipment or augurs for mixing. While at present there are no recommendations regarding tank mixing, SLAM does not cause phytotoxicity and may be used in fields treated with the new sulfonylurea post-emergent grass herbicides."

Egeberg said concerns about drift should be minimized with the low rates in the bait insecticide: "When you talk about the amount of carbaryl per acre, it's almost nothing. It's as safe as anything you're going to shoot unless you shoot water.

"With the present administration in Washington, the timing for this kind of insect control strategy is perfect. I'd like to put a bunch of this on this year."

As Miller noted: "These new concepts will boost Integrated Pest Management and adult rootworm control. They're going to enhance programs involving scouting by professionals and make the future better for everyone – farmers, consultants, applicators, and the environment."