
New fire ant controls needed now

The imported fire ant continues to spread in Texas. In the last year it has been found in 11 new counties for a total of 93 counties.

The control for the imported fire ant has been a bait which contains the poison Mirex. Its secret of success has been its slow effect. Worker ants that go out in search of food find the Mirex in the corn cob grit and oil bait. Workers, before they died, had time to remove the oil (which contains the Mirex poison), return to the mound and feed the poison to the queen and other ants in the colony.

Other insecticides are fast acting compounds that kill the food gathering worker ant before it can return to the mound and feed the other ants. The result is that most of the ants in the mound escape the effect of the compound.

How Mirex works

Mirex is a chlorinated hydrocarbon, like DDT, and is a very persistent chemical. In fact, Mirex is the most persistent of the chlorinated hydrocarbon insecticides. Because of its persistence, it slowly builds up in the environment with use.

It is stored in the fat tissue of animals. When an animal like a frog eats an ant with Mirex, the frog has a little Mirex stored in its fat; when the frog eats another ant with Mirex, a little more Mirex is stored in the frog fat. Slowly, the Mirex builds up in the frog until a toxic amount is reached.

Mirex is a slow killing compound. While it is not toxic unless present in large amounts in man, the slow buildup in the tissues of animals in the food chain leading to man present a potential hazard. It is this slow accumulation, along with the more direct effects on wildlife, that has led to the restriction in the use of Mirex and the present elimination of the use of Mirex in the area-wide program supported by

the Texas Department of Agriculture.

A search for alternatives has resulted in consideration of thousands of chemicals. None have been found that are effective in the bait as a replacement for Mirex, because they are either not active against the fire ant or they are too toxic and kill the ants before they get back to the mound. Killing the worker doesn't solve the problem as the queen continues to produce replacements.

Entomologists with the Texas Agricultural Experiment Station (TAES) have begun a search for an alternative to Mirex. One group of compounds being considered are the "juvenile hormones." They are not usually toxic to adults but prevent the development of the young into adults.

Bradleigh Vinson, TAES entomologist, explains that the juvenile hormones kill young fire ant larvae and prevent reproduction (egg laying by the queen). These compounds look promising because they have no effect on the adult ant; therefore, the adult could eat the poison and carry it back to the mound and feed the queen and larvae. Theoretically, the compound would prevent replacement of the ants, and the colony would die.

Problems exist

This worked in the laboratory, but in the field the results were disappointing. Some mounds were killed, but others were not.

Why? Experiment Station researchers set out to answer these questions instead of abandoning a potentially promising control agent.

Research has shown that adult ants that eat the juvenile hormone destroy most of it in their stomach before feeding it to the larvae or queen, so that too little is left to do the job. Even less is fed to the larvae or queen if the colony is well fed.

The next question is, can this problem be overcome? Vinson is convinced that it can be.

Research shows that ants, like many other insects, communicate by chemical smell. These compounds, called pheromones (a type of chemical language), influence the behavior of the ants. The TAES researchers have identified one of these compounds, called a brood pheromone. When this compound is added to a small granule or pellet, the workers are fooled into treating the object as one of its larvae, and they carry it into the mound.

When the pheromone and the hormone are added to a carrier, the carrier (grit) is carried into the mound by the workers and is placed with the larvae, in the mound. The hormone contaminates the larvae, the target, resulting in their death. The result is a new concept in a bait approach to control of the imported fire ant.

More work ahead

While juvenile hormones still hold promise, much more work will be necessary before it is determined that they are safe and effective and before they are available at a reasonable cost.

Researchers have also found that some insecticides can be made less toxic on contact and can also be carried into the mound with the brood pheromone and certain foods. Vinson suggests the more toxic insecticides may offer promise if new, less toxic formulations and bait approaches can be developed. He says that an alternative to Mirex can be developed but that there is much to be done before an effective replacement is available.

TAES entomologists are also working to find an insecticide that can be used by the home owner for the fire ant problem in his yard. The encapsulated and biodegradable insecticides show promise for this limited use. □