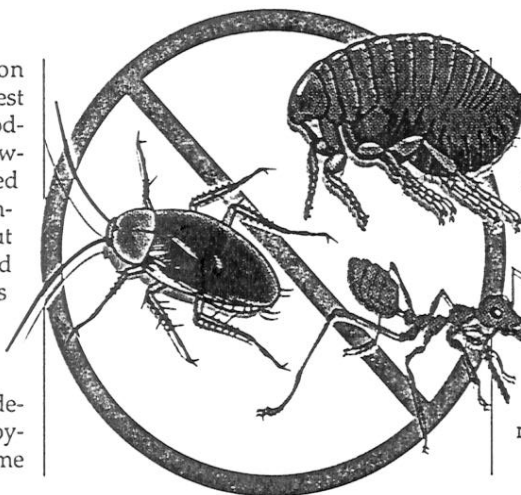


RENEWED INTEREST IN AN ANCIENT COMPOUND

RESEARCH FROM THE USDA IN FLORIDA SUGGESTS THAT THE RECENT GROUNDSWELL OF INTEREST IN THAT OLD WARHORSE BORIC ACID TO CONTROL STRUCTURAL PESTS MAY BE MERELY THE TIP OF THE ICEBERG.

BY JOHN KLOTZ & JIM MOSS

Compounds containing boron have a long history of use in pest control. With the advent of modern synthetic insecticides, however, boron compounds declined in use. Because of the public's environmental and health-related concerns about pesticide usage, there has been a renewed interest in biorational pesticides such as boric acid. Historically, the use of such compounds in structural pest control has been directed at cockroaches. More recently the use of boric acid and its derivatives in the control of wood destroying organisms, ants and fleas has become



an active area of research and development.

We believe that the potential of boric acid in pest control has not been fully realized, and there are still many untapped uses awaiting discovery. This is especially true in the area of bait research. Bait development for all kinds of pests is currently a dynamic area of research. This new focus is due in large part to public pressure for reduction of pesticide use, and may also be largely attributed to the many advantages offered by baits. For

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THE BORATE/FLEA CONTROL DEBATE

With the study described in the accompanying article related to development of a boric acid bait for flea control, it seems appropriate to reiterate here that U.S. Borax, the major manufacturer and supplier to formulators of borate products for insect control, issued a "Product Stewardship Guideline" this past May on the use of borate products. This guideline designated several uses of U.S. Borax's borate products as "inappropriate." Among the inappropriate uses, the guideline stated, "U.S. Borax's borate products are not intended for carpet upholstery applications, and shall not be used for carpet/upholstery deodorization or flea control purposes.

"U.S. Borax recommends that you and your customers not sell or use borate products for these purposes," wrote U.S. Borax President Ian L. White-Thomson in a memo to PCOs and distributors that accompanied the guideline. "U.S. Borax does not sell any of its borate products for the listed applications or uses. This guideline will be updated from time to time as needed.

"We expect all of our customers and distributors to honor and respect our guideline on borate product use. Once again, it is through this cooperation that we will succeed in achieving our mutually beneficial goal of protecting the excellent safety reputation borate products have earned over the years."

U.S. Borax's decision was prompted by concerns raised regarding exposure to dislodgeable residues of boric acid when it is applied to carpets for flea control. As *PCT* columnist George Rambo noted in a recent *Industry Observer* column, "The current use patterns for many of these (boric acid) flea control products amounts to nothing more than spreading it on the carpet and raking it in. When considering the amounts used, the methods of application, and the parameters involved with children and pets, these create too many variables for a meaningful exposure study." However, as Rambo also noted in that column, U.S. Borax's decree doesn't mean PCOs won't continue to see boric acid products for fleas available on the market, because there is at least one other boric acid supplier that has a registration in the U.S.

According to John Klotz, the researcher who co-wrote the accompanying article, if and when a boric acid bait for flea control is made available to PCOs, concerns about dislodgeable residues and exposure of children and pets may be rendered moot. "With the bait we're testing, you only need to use very small amounts, and you only place them in specific, localized areas," Klotz said. "So these issues (exposure, residues, etc.) would become non-issues." —Pete Fehrenbach

U.S. BORAX

RENEWED INTEREST

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example, baits are more target-specific than traditional control techniques, and in many cases more cost-effective over the long term.

As avid supporters of the practice of using the least toxic insecticides, we report here on some of our recent findings with boric acid used to control ants, fleas and cockroaches. These findings may offer some useful applications and perhaps even stimulate further research.

BORIC ACID ON ANTS. Of all the pest insects, ants are the ideal subjects for bait control. This is due to their highly social habits, such as chemical recruitment to food sources and food sharing between nestmates. If a bait is sufficiently attractive to ants, it will be rapidly carried back to the nest and distributed to the entire colony. To accomplish this requires using a slow-acting toxicant, so that the ants have sufficient time to collect and distribute the poison before it reaches a lethal level. At low concentrations, this is precisely how boric acid works.

Another advantage of boric acid is its solubility in water. Not only is water a convenient carrier, but it also helps meet the ants' need for moisture in their diet. Additionally, liquid baits exploit the natural feeding habits of sweet-eating ants that collect honeydew, nectar or other plant juices. We also found in our studies an additional crucial reason for using boric acid in a bait: It works like a desiccant, causing dehydration of the ants, which forces them to drink more of the bait.

We are currently field testing a boric acid bait on carpenter ants, ghost ants and Argentine ants at the USDA Agricultural

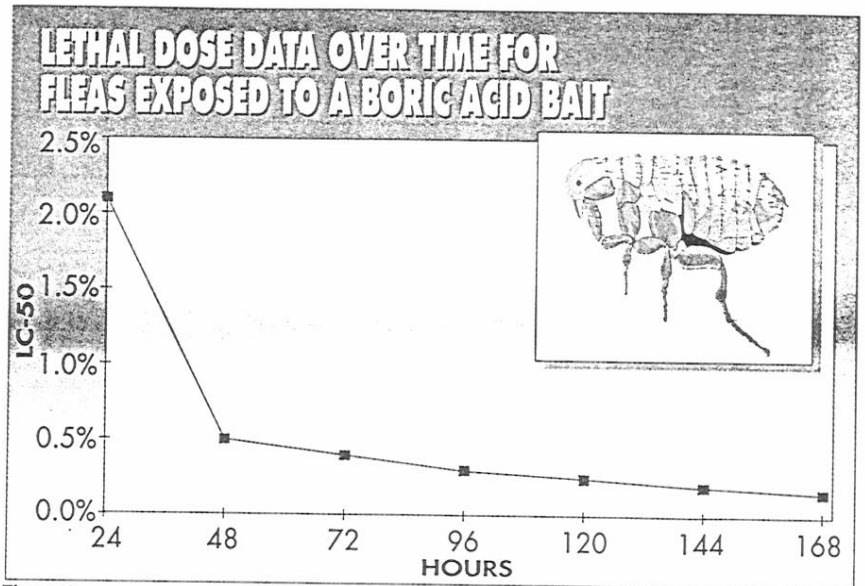


Figure 1.

Research Service facility in Gainesville, Fla. These preliminary trials indicate that our bait can be highly effective under certain conditions. We feel this bait may be

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equally attractive to many other sweet-eating ants.

BORIC ACID ON FLEAS. Today we are witnessing a rapidly growing industry of borate products for flea control. We have tested many of these products at our USDA facility and have found them to be highly effective for larval flea control. We feel, however, that the application rates of these products can be significantly reduced, especially if they are incorporated into baits.

We attempted a first approximation

with a boric acid bait that we applied to carpet material. A very low concentration of boric acid was effective (see Figure 1 above). However, this applies only to the actively feeding larval stages and not to the prepupal, pupal or adult stages, which we found to be unaffected by boric acid. Even though these other stages are not affected, killing the larvae breaks the life cycle and leads to eventual control.

BORIC ACID ON COCKROACHES. In cockroach control, boric acid has been used primarily as a stomach poison, either as a dust that is ingested by the cockroach during grooming or as a toxicant incorporated into a bait. Traditionally, however, the concentration used in baits has been very high, sometimes as much as 50% boric acid.

Again, as with ants and fleas, the amount of boric acid needed to kill cockroaches is very low compared to what is currently being recommended. The concentration may be reduced even further with the addition of synergists being developed in our laboratory (see Table 1 at left). The synergists facilitate the quicker kills desired in cockroach control.

SUMMARY. We feel that an entire line of borate products could be developed for structural pest control. At the low concentrations we recommend, these products would be safe for the customer, the PCO and the environment. We foresee companies offering a complete pest control service based on least toxic chemical use with careful inspections, heavy reliance on habitat modification, use of biorational pesticides, and thorough education of the customer on the importance of proper maintenance of the structure and good sanitary practices.

PCT

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SYNERGIST EFFECT ON BORIC ACID TOXICITY TO THE GERMAN COCKROACH *BLATTELLA GERMANICA*

| SYNERGIST | SYNERGIST DOSE (%) | LC-50 (%) AT 96 HRS | SYNERGISM RATIO |
|------------|--------------------|---------------------|-----------------|
| NONE | 0 | 16.4 | 1 |
| COMPOUND A | 10 | 4.0 | 4 |
| COMPOUND B | 2 | 1.3 | 13 |
| COMPOUND C | 1 | 0.16 | 99 |

BORIC ACID AND THE SYNERGISTS WERE MIXED INTO COCKROACH FOOD. BORIC ACID CAN BE USED AS THE TOXIC AGENT OR AS THE SYNERGIST. WHEN MIXED WITH SYNERGISTS, BORIC ACID CAN ACT MORE QUICKLY AND AT LOWER DOSES SO THE COCKROACHES ARE LESS LIKELY TO REJECT A BAIT.

Table 1.