

by Lonnie H. Williams

Controlling Termites and Carpenter Ants with Borates

Treating the frame on site with this common nontoxic chemical can be effective against insect pests

Borates are an ideal material for protecting buildings from carpenter ants, termites, and other wood-damaging insects. They are effective against a broad spectrum of pests and decay fungi, have no odor, do not discolor wood, and are no more toxic to humans than common table salt.

Borates also offer deep penetration of dry wood compared with other insecticides and are readily available from pesticide formulators and distributors. Because borates are so effective and so benign to the environment, their use is growing rapidly.

Common Uses of Borates

Borate is a generic term for a compound containing the elements boron and oxygen. Examples of borates include boric acid, borax, and disodium octaborate tetrahydrate (DOT). Boron compounds are pervasive in our daily lives. The average person following a balanced diet containing fruits and vegetables consumes about 25 mg of boron every day. Trace amounts of borates occur in eyewashes, cosmetics, and mouthwashes; large quantities are found in washing powders (20 Mule-Team Borax) and fire retardants.

People may be familiar with boron's pesticidal properties from various cockroach control products, which are essentially just boric acid. Bora-care and Tim-bor, however, are less well known. EPA registration was granted for Bora-care, a glycol/borate formulation containing DOT, as an insecticide and preservative in 1989. Tim-bor, a brand name for DOT, was registered as a preservative in 1973 and as an insecticide in 1990.

Borates In Action

Research suggests that borates inhibit enzymes that aid food breakdown in the gut of insects. In most cases, insects must ingest some boron from food or from cleansing themselves to be killed.

While a tiny amount of boron can kill individual termites, to repel a large population of the insects you need at least 1,500 ppm (about 0.9% boric acid on a weight-to-weight basis in wood). Minimizing damage from Formosan termites (found in Hawaii and southern coastal regions) requires 3,500 ppm (2.0% boric acid).

Worker termites and carpenter ants eating a small amount of boron live long enough to transfer boron-tainted food to other colony members by feeding soldiers, young, and reproductives. In this way the boron becomes a slow-



Figure 1. For an effective treatment against termites and carpenter ants, PCOs spray all framing and sheathing surfaces with a borate solution at the "dried-in" stage of construction. The low-pressure sprayer uses a wide nozzle to deliver a fan-shaped spray (above).

acting toxic "bait," often eliminating most or all of a colony.

Thus, borates offer the same capability as the new termite baiting systems now being widely promoted, but they don't require expensive monitoring and repeat applications. In fact, a one-time application of borates to structures may permanently repel attacks by termites, carpenter ants, wood-destroying beetles, and decay fungi, as long as the borates are not subjected to persistent exposure to water.

Field-Applied Borates

If you were a builder in New Zealand, you would be legally required to use borate-treated wood for the house framework — a technique used successfully there since 1955. Framing lumber pressure-treated with borate is also readily available to builders in Hawaii and

the U.S. Virgin Islands.

On the mainland U.S., however, borate-treated wood is available from only a handful of lumber companies, primarily suppliers to the log-home industry.

Where borate-treated lumber is not available, another approach is to apply borates in the field during construction. This option is growing in use by licensed pest control operators (PCOs), largely due to the environmental concerns PCOs face regarding more toxic chemicals.

Penetration in Wood

Field-applied borates penetrate wood by a combination of absorption and diffusion. In diffusion, the chemical moves through the water in the wood from a high concentration on the surface to a lower concentration within. For effective

diffusion to occur, the wood must be above the fiber-saturation point (about 25% moisture content). Complete, rapid penetration by diffusion requires unseasoned wood with 40%, and preferably higher, moisture content and several weeks of storage where drying of wood is restricted (such as by tarping). Some borates also enter by absorption of water into the surface of the wood.

In new construction treated on site, the borates will typically penetrate 1/8 to 3/8 inch beneath treated surfaces. Penetration will be somewhat deeper if the wood has higher-than-average moisture levels. Even though not completely penetrating wood, borates may still effectively prevent insect attacks. Here's why.

Boron in the outer layer of treated wood typically may range from about 1,500 to 2,500 ppm of boron — much above the levels needed to kill insects. Also, boron will continue to penetrate the wood slowly by diffusion, absorption, or movement across the wood surface (when wetted from condensation). The high humidity typically found in new homes during the first year can work to your advantage here. Data also shows that ends and backs of studs may obtain borate even when not directly treated, although it is best to avoid exposing untreated ends by not cutting any wood after treatment.

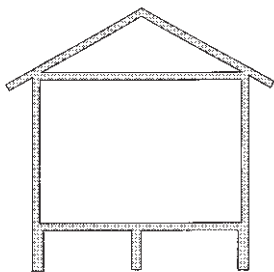
Borates also uniquely exploit insect feeding and foraging habits. For example, subterranean termites typically build tubes of soil to the wood being attacked. Because the termites keep the tubes and wood moist with water from the soil, borates quickly diffuse into the damaged wood and tubes. Thus, many termites contact boron and are discouraged from feeding or building more tubes.

Limitations of Borates

One concern with borates is that they are soluble in water and can, therefore, leach out of wood. The advantage moisture brings in helping to achieve better treatment of building timbers also limits the usefulness of borates on a building's exterior because extensive leaching would occur within a few years. Borates should not be applied to exterior wood

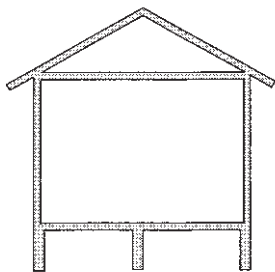
Where to Treat With Borates

For carpenter ants or drywood termites



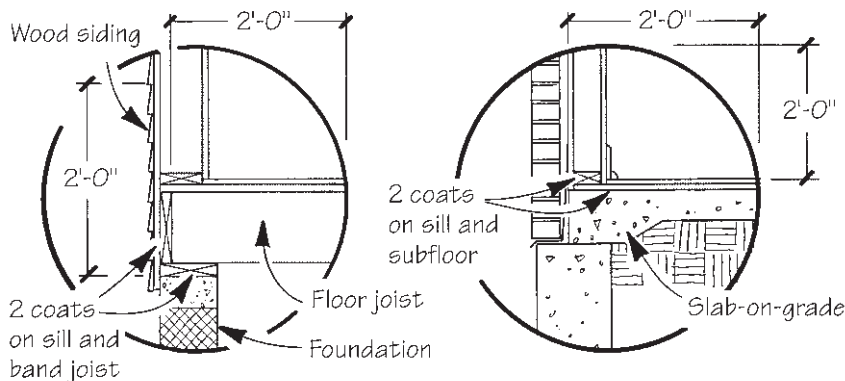
All exposed wood on interior and exterior walls, partition walls, crawlspace, and attic.

Subterranean termites (with Tim-bor)



All exposed wood on interior and exterior walls, partition walls, and crawlspace.

Subterranean termites (with Bora-care)



A 2-foot uninterrupted band above sills around perimeter walls; all wood 2 feet in from foundation wall or crawlspace perimeter; 2 feet around all piers, utility openings, fireplaces, and connections to porches and garages.

unless it is subsequently coated with paint, water repellent, or other covering. And although borates can be effectively injected in timbers in ground contact, they do not last long in that application.

The key uncertainty for borate treatment in new construction is how well it controls subterranean termites over the long term. Although testing and field experience during the past 5 to 10 years is very positive, it does not go back far enough to be conclusive. However, with many documented failures of traditional soil treatments, many PCOs believe that the best approach available today is borate treatment of wood as a supplement to soil treatment with termiticide.

Borate is also proving itself effective as a stand-alone pretreatment in new construction. If field experience with borates shows continuing success, increasing consumer demand may permanently change the traditional approach to termite prevention.

Regulations

The federal EPA requires that anyone who provides services or products to others claiming to prevent or control pests must use EPA-registered products or face stiff fines. Every EPA-registered product carries a label that specifies the pest and application site, and PCOs are required to follow that label.

While some borate compounds are labeled for use against termites, other institutional barriers to their use exist. For example, in most southern states and many other areas, certified termite treatment with traditional termiticides

is required in order to get a building permit and bank financing. Termite treatments are inspected and enforced by structural pest control officials in about 35 states. In most cases, these regulators require soil treatment with termiticide around and beneath the foundation, as has been done for 50 years.

If code or loan officials in your area are uncertain about the effectiveness of borates against termites, you may sway them with the following facts:

- Bora-care literature states that it is “recognized by EPA as a primary termiticide treatment for both eliminating existing infestations and preventing future infestations.”
- Tim-bor literature reports PCO use as a preventive treatment.
- Traditional termiticide soil barrier treatments are frequently failing partly because termites can transport untreated soil to build “bridges” across these barriers. This has been verified by PCOs, regulators, and government researchers.
- Many PCOs currently supplement soil treatments with borate wood treatments.

Even with official approval, concerns about property value and potential liability will deter most builders in termite-prone areas from treating houses solely with borates. However, readers who live where termite-control regulations are limited or where carpenter ants cause more damage than termites should consider borates as a viable option. Anyone can use labeled or unlabeled products, including borates, to

treat houses they are building for themselves or existing houses they own.

Preventive Treatment of New Construction

I strongly recommend carefully reading labels and company literature for the major EPA-labeled borate pesticides whether you use a PCO or apply the product yourself. The labels and literature, especially from Nisus Corp., provide many details about the insects and their treatment that cannot be adequately covered here. In addition, application directions differ for different products. Effective, long-lasting control of both carpenter ants and termites requires more than just spraying all exposed wood with borates.

Both ant and termite treatments should be done at the “dried-in” stage of construction when all structural wood and sheathing is installed and the roof is on, but before installation of dry-wall, insulation, mechanical systems, and electrical wiring.

In general, all exposed wood, exterior and interior, should be treated with borate solution until thoroughly wetted, using a low pressure sprayer (see Figure 1, page 49). Tim-bor should be applied to all exposed wood for both ants and termites using a 15% solution (1.5 lb. of powder per gallon of water). Bora-care is applied at a 1:1 dilution of the supplied concentrate with water for termites, and at a 2:1 dilution rate for ants.

Bora-care can be applied more selectively, according to research, because of its greater toxicity. Applications for ter-



Figure 2. Areas prone to termite entry that can only be treated from one side — such as this band joist — should get two borate applications.



Figure 3. Borate treatment of the wood near utility pipes provides extra protection. Traditional soil treatments are also advised around such slab penetrations.



Figure 4. To control outdoor populations of carpenter ants, broadcast bait around the perimeter of the building, as well as around nearby trees, stumps, and firewood piles.

mites can be limited to the lower 2 to 3 feet of walls and a 2- to 3-foot-wide strip around the perimeter of crawlspaces and basement foundations and around piers (see “Where to Treat With Borates,” page 50).

Both borate products should be applied twice to surfaces of wood members that are critical areas for termite attack and that can only be treated on one side — such as band joists, box sills, sill plates, and girders (Figure 2, previous page). For slabs and basements, the soil around utility pipes and expansion joints must be treated with termiticide (Figure 3, previous page).

Ant treatment. Dusts can also be used for pretreatment, but these don’t coat all wood surfaces as well as solutions, and they tend to cake and lose effectiveness over time. A product such as Niban FG is better than straight boric acid, because it is coated for better moisture resistance. In general, dusts are better suited for treatment of ants in existing construction.

I believe that builders and owners should work together for effective control of carpenter ants. Ants often have colonies outdoors and will forage into a house for food via openings around plumbing or wiring and will travel along these materials within houses, thus avoiding treated wood. Therefore, effective control often requires bait applications to reduce outdoor populations. The product of choice is Niban Granular Bait, which should be broadcast in a 2- to 4-foot band around the perimeter of the house and around all logs, stumps, and so forth (Figure 4). This product contains food attractive to ants and is coated to

withstand up to 2 inches of water before losing effectiveness.

Use in Existing Construction

PCOs have started using borates widely in existing homes over the past six to eight years and have generally given them favorable reports. Borates can often provide control when other treatments are not effective or are too costly.

In existing construction, PCOs can typically do a better job than contractors or homeowners because of their specialized equipment and familiarity with insect behavior. Application methods include sprays, injections, dusts, fogging, ultra-low-volume mists, and in-foam carriers.

For example, PCOs can deliver borates

in a foam carrier to treat otherwise inaccessible areas beneath beetle-infested hardwood flooring or termite-infested window and door frames. For deep-seated termite or beetle infestations in large timbers, borate can be injected into holes drilled in the timbers. This technique is used with log homes where the timbers are too wet or too large for effective fumigation.

PCOs can also inject borates into posts, piers, and pilings with untreated centers which are vulnerable to termite damage. Untreated centers often result when large timbers are pressure-treated with preservatives such as CCA or creosote.

While surface treatments with borates are generally effective, they will not protect the interiors of wood pieces from the aggressive Formosan termite. Many PCOs also report better control of active infestations of termites with Bora-care than with water-based solutions, possibly because of the better coating of dry wood surfaces and the higher toxicity compared to pure DOT. ■

Lonnie Williams is owner of Rich Mountain Wood Protection Services in Gulfport, Miss., and is a former entomologist at the USDA Forest Service Wood Products Insect Research Laboratory.

Sources of Supply

The following listing provides sources of EPA-labeled borate products for beetles, carpenter ants, and termites. To obtain Bora-care and Tim-bor, the two major products, call the manufacturer’s 800 number for a local distributor.

Nisus Corporation

**215 Dunavant Dr.
Rockford, TN 37853
800/264-0870**

***Bora-care, Niban Granular Bait,
Jecta Diffusible Boracide***

Perma-Chink Systems, Inc.

**1605 Prosser Rd.
Knoxville, TN 37914
800/548-3554**

Shellguard Guardian

Sashco

**10300 E. 107th Place
Brighton, CO 80601
800/767-5656**

Penetreat Impel Rods

U.S. Borax

**26877 Tourney Rd.
Valencia, CA 91355
800/984-6267**

Tim-bor Insecticide

Note: Two unlabeled products, chemically identical to Tim-bor Insecticide but less costly, are Solubor, a fertilizer-grade borate available from agricultural supply centers, and Tim-bor DPT, available from Sashco. With either, follow label directions for Tim-bor Insecticide. Another option is mixing 1.2 parts borax and 1 part boric acid, yielding a similar compound.