

Pesticide Toxicity Profile: Boric Acid¹

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This document provides a general overview of human toxicity, provides a listing of laboratory animal and wildlife toxicities and a cross reference of chemical, common and trade names of boric acid insecticides registered for use in Florida.

General

Pesticide products registered for insecticide use in Florida containing boric acid primarily are used for control of ants and cockroaches. They act as stomach poisons and desiccants as they abrade the wax from an insect exoskeleton. Several products are applied as wood treatments for preservation and protection against termites. They are labeled for a wide range of sites, both agricultural and nonagricultural. Prev-Am® is a relatively new product used for control of both fungi and insects on many crops. Many formulations are commercially available, including baits, dusts, powders, liquids and impregnated materials. The basic element of boric acid, boron, is ubiquitous in the environment and is an essential nutrient for plants and many organisms. In the U.S., boric acid was first registered as a pesticide in 1948. There are currently over 100 products registered for

use in Florida. EPA has determined that, because of its low toxicity and natural occurrence, boric acid should be exempted from the requirement of a tolerance (maximum residue limit) for all raw agricultural commodities. Because one of its uses is as a crack and crevice treatment in food and feed handling establishments, the potential exists, though unlikely, for residues to occur in food. For this reason, EPA is establishing food and feed additive tolerances for boric acid.

Toxicity

Boric acid generally is of moderate acute toxicity, and has been placed in Toxicity Category III for most acute effects including oral and dermal toxicity, and eye and skin irritation. Most poisonings by boric acid have occurred in connection with its former use as a local antiseptic applied to irritated skin, burns, or wounds or from mistakenly including it in feeding formula for babies. However, children also have ingested the compressed tablets targeting cockroach control. The fatal dose is thought to be 2,000 – 3,000 mg for infants, 5,000 – 6,000 mg for children and 15,000 – 20,000 mg for adults. EPA has

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The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication does not signify our approval to the exclusion of other products of suitable composition. Use pesticides safely. Read and follow directions on the manufacturer's label.

classified boric acid as a “Group E” carcinogen, indicating that it shows “evidence of noncarcinogenicity” for humans. Boric acid materials scattered on the floors of homes do present a hazard to children. Its frequent use for cockroach control increases access for ingestion. Chronic ingestion is more likely to cause significant toxicity than acute exposure. They are absorbed by the gut and abraded or burned skin, but not intact skin. The kidneys efficiently excrete these compounds and the residence half-life in humans averages 13 hours. Symptoms include nausea, persistent vomiting, abdominal pain and diarrhea. In severe poisonings, a red skin rash affecting palms, soles, buttocks and scrotum has been reported. EPA's concerns regarding risks to birds, fish and wildlife are minimal. Mammalian toxicities for boric acid are shown in Table 1. Table 2 lists the toxicities to wildlife by the common name of the pesticide. Table 3 provides a cross listing of many of the trade names that these products are registered and sold by in Florida.

Additional Information

Crop Protection Handbook. 2005. vol. 91.
Willoughby, Ohio: Meister Publishing Co.
<http://www.meistermedia.com/publications/handbook.html>.

Nesheim, O.N, F.M. Fishel and M.A. Mossler.
2005. Toxicity of pesticides. UF/IFAS EDIS
Document PI-13. <http://edis.ifas.ufl.edu/PI008>.

Reigart, J.R. and J.R. Roberts. 1999. Recognition
and management of pesticide poisonings, 5th
edition. United States Environmental Protection
Agency Publication EPA-735-R-98-003.

Seyler, L.A., et al. 1994. Extension toxicology
network (EXTOXNET). Cornell University and
Michigan State University.
<http://extoxnet.orst.edu/index.html>. Visited
December 2005.

Young, E.G., R.P. Smith and O.C. MacIntosh.
1949. Boric acid as a poison. Can. Med. Assoc.
J.:61:447 – 450.

Table 1. Boric acid mammalian toxicities (mg/kg of body weight).

Common name	Rat oral LD ₅₀	Rabbit dermal LD ₅₀
Boric acid	3,500	>10,000

Table 2. Boric acid wildlife toxicity ranges.

Common name	Bird acute oral LD ₅₀ (mg/kg)*	Fish (ppm)**	Bee [†]
Boric acid	PNT	PNT	PNT
<p>*Bird LD₅₀: Practically nontoxic (PNT) = >2,000; slightly toxic (ST) = 501 – 2,000; moderately toxic (MT) = 51 – 500; highly toxic (HT) = 10 – 50; very highly toxic (VHT) = <10.</p> <p>**Fish LC₅₀: PNT = >100; ST = 10 – 100; MT = 1 – 10; HT = 0.1 – 1; VHT = <0.1.</p> <p>[†]Bee: HT = highly toxic (kills upon contact as well as residues); MT = moderately toxic (kills if applied over bees); PNT = relatively nontoxic (relatively few precautions necessary).</p>			

Table 3. Cross reference list of common, trade and chemical names of boric acid products.

Common name	Trade names*	Chemical name
Boric acid	Boric acid®, CB®, Drax®, Eco®, Hot Shot®, many others	Boric acid, borax, sodium polyborate, sodium tetraborate, many other forms of boron
*Does not include manufacturers' prepackaged mixtures.		