

These are a few commonly relevant sections from studies on the efficacy of Boric Acid against mosquitoes. There are literally hundreds of studies dating back decades that can be furnished upon request. THE USE OF BORIC ACID TO KILL MOSQUITOES IS A VERY WIDELY HELD SCIENTIFIC FACT

1. Boric acid (1%) in 5% sugar water bait solution was applied as a spray to the foliage, stems, and other surfaces of plants for control of adult *Aedes albopictus*, *Culex nigripalpus*, and *Ochlerotatus taeniorhynchus*. Initial studies outdoors in small (1.42-m³) screened cages showed that exposure of male and female mosquitoes to 1% boric acid bait for 48 h resulted in 80 to 100% mortality in *Ae. albopictus* and 98% mortality in *Cx. nigripalpus* and *Oc. taeniorhynchus*.¹
2. The plants treated with ATSB/IGR resulted in 60–100% mortality of laboratory-reared adult *Ae. albopictus* ($F_{2,12} = 18.5$; $P < 0.001$; Fig. 1). Boric acid sugar baits with pyriproxyfen resulted in an average of $63.3 \pm 16\%$ mortality that was statistically different from the zero mortality (%) observed in the control mosquitoes ($t = 3.2$; $df = 4$; $P = 0.05$).²
3. The plants treated with attractive toxic sugar baits plus the IGR resulted in 60–100% mortality of laboratory-reared adult *Ae. albopictus*. The pyriproxyfen solutions collected from the plant wash experiment resulted in 80–100% emergence inhibition to the exposed third- and fourth-instar larvae, compared with the untreated control.²
4. Several research reports have demonstrated that boric acid baits and pyriproxyfen alone have a low ecotoxicological impact (WHO 2001, Revay et al. 2014) and are environmentally safe for mosquito control (Estrada and Mulla 1986, Schaefer et al. 1988, Sihuinchu et al. 2005).²
5. Laboratory evaluations of boric acid sugar baits applied to the plant *Pentas lanceolata* (Rubiaceae) demonstrated 100 and 92 % mortality of *A. albopictus* at day 7 and 14, respectively.³
6. Field application of the boric acid sugar baits significantly ($P < 0.05$) decreased adult *A. albopictus* populations up to day 21 post-treatment compared to the pre-treatment population numbers.³
7. In the laboratory tests, 1% boric acid bait resulted in >96% mortality in male and female *Ae. albopictus* for 14 days.⁴
8. The rate of survival in boric-acid-exposed male and female mosquitoes was significantly lower than in control mosquitoes. Among the baited mosquitoes, survivorship of females was consistently higher than in the males in all post exposure observations ($r = 3.476$; $df = 9$; $P = 0.007$).⁵
9. It is evident from this study that boric acid at 0.1% mixed with 10% sugar bait significantly reduced adult survival of both male and female *St. albopicta* under laboratory conditions.⁵
10. Immediately after spraying ATSB in the treatment site, the relative abundance of female and male *An. gambiae* s.l. declined about 90% from pre-treatment levels and remained low.⁶
11. Mosquito mortality was calculated by counting the number of dead male and female mosquitoes at 24 and 48 h post-exposure. The mean number (51, 102) of dead males exposed to boric acid bait (treatment) was significantly higher than in control mosquitoes (5, 12) at 24 h ($t=6.850$, $df=4$, $P=0.002$) and 48 h ($t=20.893$, $df=4$, $P=0.000$), respectively.⁷
12. Field applications of ATSBs using spinosad and boric acid as insecticides demonstrated the potential effectiveness of ATSBs by decimating *Anopheles sergentii* populations approximately

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by 95% in Israel⁸ and *Anopheles gambiae* sensu lato (*s.l.*) by 90% in Mali^{6,9}

13. Boric acid, at least in bait stations, is environmentally friendly with a low toxicity for vertebrates; it was used in combination with sugar as a phagostimulant and CO₂ as an attractant to “attract and kill” several mosquito species in large outdoor release cages (Xue and Barnard 2003) and in the field (Xue et al. 2006) in Florida.⁸
14. The new ATSB methods are highly effective, technologically simple, low-cost, and circumvent traditional problems associated with the indiscriminate effects of contact insecticides¹⁰ by narrowing the specificity of attraction to sugar-seeking mosquitoes and by using environmentally safe oral toxins such as boric acid, that is considered to be only slightly more toxic to humans and other vertebrates than table salt^{11,12}
15. A single spray of fermented fruit solutions with 1% (W/V) toxin boric acid on vegetations around larval habitats in Mali, West Africa, obtained 90% reductions in abundances of *An. gambiae* s.l. populations in 30 days.¹³
16. Boric acid (H₃BO₃) is being used effectively nowadays in traps/baits for the management of *Aedes aegypti* L. and *Aedes albopictu*.¹⁴
17. The ovicidal concentration of boric acid for 100% mortality in *Aedes* sp eggs is 1%. Effective concentration for the oviposition attraction is 0.5%. At 1% concentration, larvae of both the species died within 24 h.¹⁵
18. Boric acid is a registered pesticide worldwide. Pesticide products containing boric acid and its sodium salts are registered in the U.S. for use as insecticides, fungicides and herbicides.¹⁵
19. In Mali, researchers reported that spraying local plants with a bait of fermented fruit juice mixed with boric acid reduced the population of *An. gambiae* by 90% at one study site¹⁶
20. The field experiment showed that boric acid sugar baits sprayed on plants within a hammock island near salt marshes resulted in the significant reduction of landing rate counts on human subjects (Fig. 2, $F_{1,52} = 4.46$, $P < 0.05$).¹⁷
21. In the black mangrove laboratory experiment we found 52% mortality at 48 h. This per- cent mortality is less than that reported by Xue et al. (2006, 2008), who found > 80% mortality in the application of boric acid to vegetation against a laboratory-reared population of *Ae. taeniorhynchus* in the laboratory and in a semi- field trial.¹⁷
22. Boric acid and borax are white crystalline products that readily dissolve in water to form undissociated boric acid and borate anion at high pH. The solubility of borates means that they are widely dispersed and do not bio-accumulate in the environment or in humans.¹⁸