

Improvement of the effectiveness of bait technique by liquid attractants and arrestants in termite management

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Although the bait-application is well known as an environmentally sound method of subterranean termite management, both difficulty in discovering baits by termites and low termite-arrest on baits have been critical for successful termite management. The use of attractants and arrestants is thought to improve the baiting program. The object of this study was to evaluate sports drinks and their derivatives as attractants and/or arrestants for improving the effectiveness of bait technique against subterranean termites.

Materials and Methods

Sports drinks and preparation of their derivatives: Five commercial sports drinks (A, B, C, D, E) were chosen by their ingredients. Four sports drinks (A, B, C, E) without phosphate were mixed with ammonium dihydrogenphosphate (P), and three sports drink derivatives and one sports drink (AP, BP, D, EP) without sugars were prepared by mixing with sucrose (S) for filter-paper choice-test. Three treatment concentrations (1/1, 1/5, 1/10) were prepared by diluting sports drinks with distilled waters for soil choice-test. Seven treatment liquid samples (A:1/1, A:1/5, A:1/10, B:1/10, C:1/5, E:1/5, E:1/10) were additionally prepared by mixing with ammonium dihydrogenphosphate.

Choice-test using filter paper: A filter paper was divided into quarters and two each of them were treated with sports drinks or modified liquid samples and distilled water, respectively. Each of these papers was placed on a petri dish. Thirty workers and three soldiers of *Coptotermes formosanus* Shiraki were introduced in the central petri dish. The number of termites present in treated and untreated areas was counted at regular intervals. After 5 days, consumption of filter papers was calculated.

Choice-test using soil: Three acrylic cylindrical containers were connected by acrylic tubes. A bottom of center container was formed by plaster, and two side containers were placed inside petri dishes. Soils were mixed with an individual treatment liquid sample and distilled water and put into side containers, respectively. Wood blocks were placed on the soil surface. One hundred workers and ten soldiers of *C. formosanus* were introduced into the center container. After three weeks, consumption of wood blocks was determined and the number of termites present in each container was counted at the end of test.

Result and Discussion

Choice-test using filter paper: Treated filter papers were consumed equally to or more than untreated ones except for DS. Significantly higher consumption was seen in the following cases: A, C, AP, CP, EP, P and EPS. The number of termite on treated filter papers was greater than on untreated ones in some cases. The addition of phosphate seemed to enhance the consumption of filter papers and termites arresting. In contrast, the addition of sucrose was not always favorable for attraction and arrest/aggregation of termites on the treated filter paper.

Choice-test using soil: It was clearly shown that consumption of the wood blocks was significantly greater in the container treated with C (1/5), D (1/10), AP (1/1), AP (1/5) and CP (1/5) than in untreated container ($P<0.05$). The number of termites was significantly greater than in the container treated with B (1/1), C (1/1), D (1/1), AP (1/1) and CP (1/5) than in untreated container ($P<0.05$). Attractant and/or arrestant effects of each treatment sample on *C. formosanus* were varied with dilution rates, and the addition of phosphate increased these effects in some cases.

Conclusion

These results suggested that when potential sports drinks are selected, applied at appropriate concentrations and mixed with co-agents such as phosphate, it is quite possible that they are thought to contribute to the increased effects as attractants and arrestants.