

The Effects of Sanitation and Aging on Efficacy of Cockroach Insecticide Baits

Michael Woodruff

Mentor: Dr. Ameya Gondahaler

Introduction:

German cockroaches (*Blattella germanica*) are considered a major pest species in commercial and residential buildings. They are one of the main pest species that dominate pest professional's main objectives of elimination and or control. The possibility of health consequences from infestation of the home or business is a serious issue. They have been known to cause serious allergic reactions over long periods of exposure and are known to carry multiple different parasites that can have serious medical implications to humans. "They are proven or suspected carriers of the organisms causing: diarrhea, dysentery, cholera, leprosy, plague, typhoid fever, viral diseases such as poliomyelitis. In addition, they carry the eggs of parasitic worms and may cause allergic reactions, including dermatitis, itching, swelling of the eyelids and more serious respiratory conditions." (Stankus RP, 1990)

The nuisance aspect of the species is a physiological one of filth and or the presence of disease. It can also be added to a potent sickly sweet or musky smell in high populations. This can lead owners of restaurants/businesses or homes to take drastic measures in the control of said infestations. This can lead to the over use or misapplication of caustic chemicals that can even lead to further health issues if not performed or applied correctly.

German cockroaches have an incomplete metamorphosis (egg, nymph, adult). They can live for over a hundred days and can lay up to four hundred eggs in a life cycle, about 30 to 40 eggs per ootheca. The German cockroach is distinct in that it carries its ootheca to term in which the nymphs hatch out of the ootheca while its being carried by the adult female. This can make control difficult but possible. They prefer areas with sanitation issues, low light and a high heat with abundance of water, but they can survive on very little waste debris which can make control much more difficult.

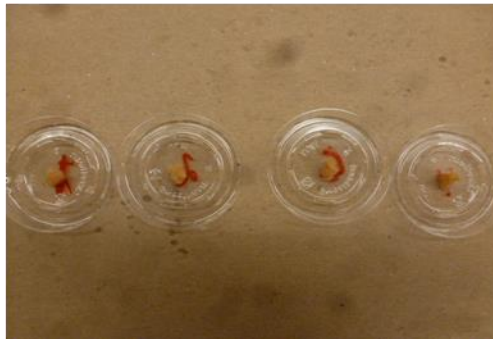
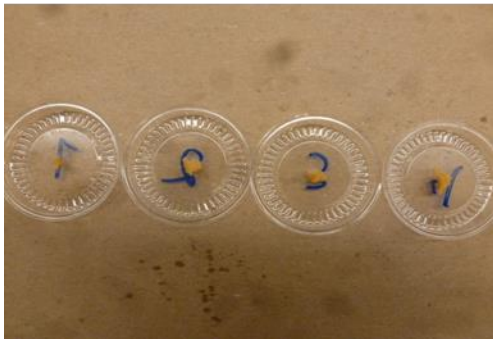
Sanitation has become one of the major control factors in reducing and our eliminating German cockroach infestations. In my capstone project I brought forth a hypothesis of "How does sanitation and aging bait directly effect gel bait efficacy and mortality in German cockroaches."

Materials and Methods

In this bioassay I used colony boxes 11x15x8 for use in holding and conducting each replicate. Harborage was a small piece of tented cardboard. It was placed with a rodent diet and small cup of water to allow roaches food, shelter, and a water source. Roaches where placed

twenty-four hours before bait placement to allow acclimation to new environment before insecticidal bait treatments were placed.

Baits were aged for a period of one, two, and three-month periods either with or without a sanitation component. Sanitation component was generated using a non-stick food spray and crackers crushed to a clumped and or powdered consistency. This was applied to small portion cup lids one day before application of bait treatment. Treatments were weighed at application and before addition to the bioassay boxes. Due to the sanitation component accurate weighing was unable to be performed during the first initial feeding response of eight-hours. Four



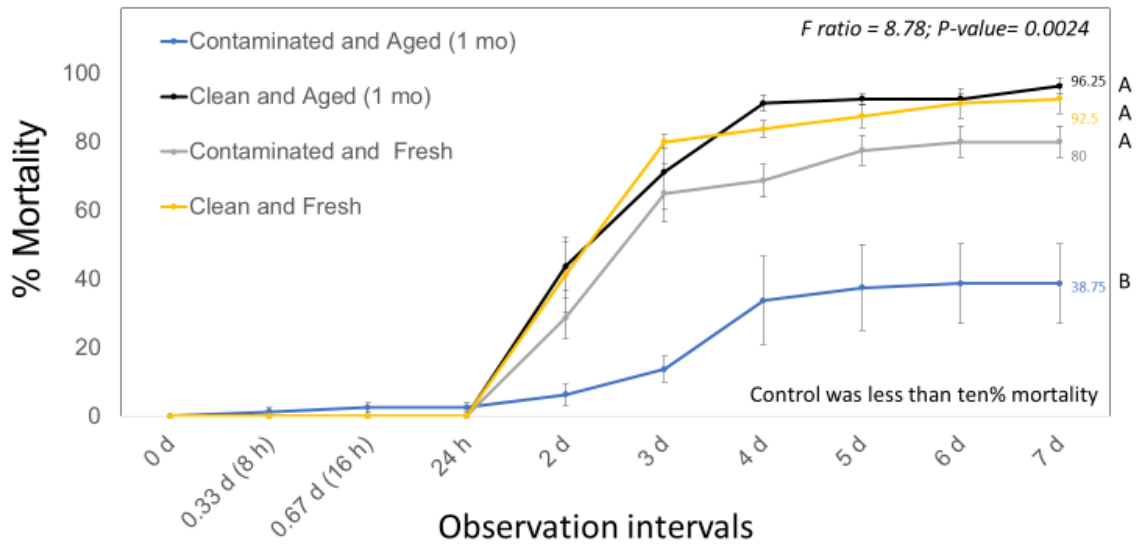
replicates were used in each treatment. Sanitation components were placed with aged baits and fresh baits as well as fresh and aged baits with no sanitation component. Mortality was checked at 8, 16, and 24-hour time periods for the first 24 hours then every 24 hours after that for a seven-day period or until complete mortality.

The strain used was “Merriwell” that was collected in 2009. Twenty roaches were used in each replicate bioassay box. Five males 5 non-gravid females and 10 nymphs. This process was used in each replicate from 1 month thru 3-month time periods. The gel bait was a food matrix with the main ingredient of Indoxacarb.

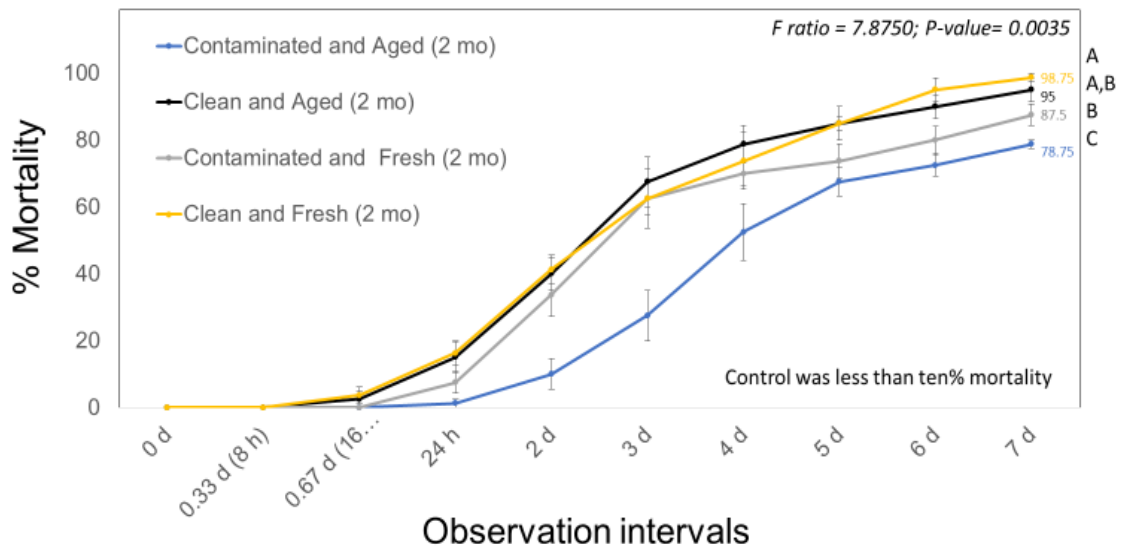
Results

Through the bioassays and replicates I generated multiple conclusions for how aging gel baits and sanitation can affect cockroach mortality.

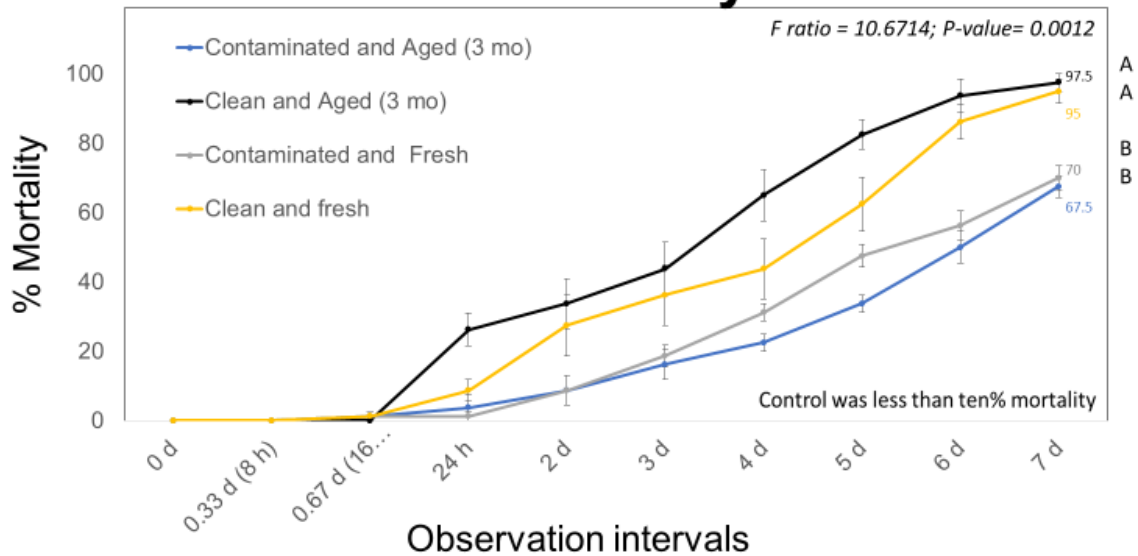
One Month Mortality Trends



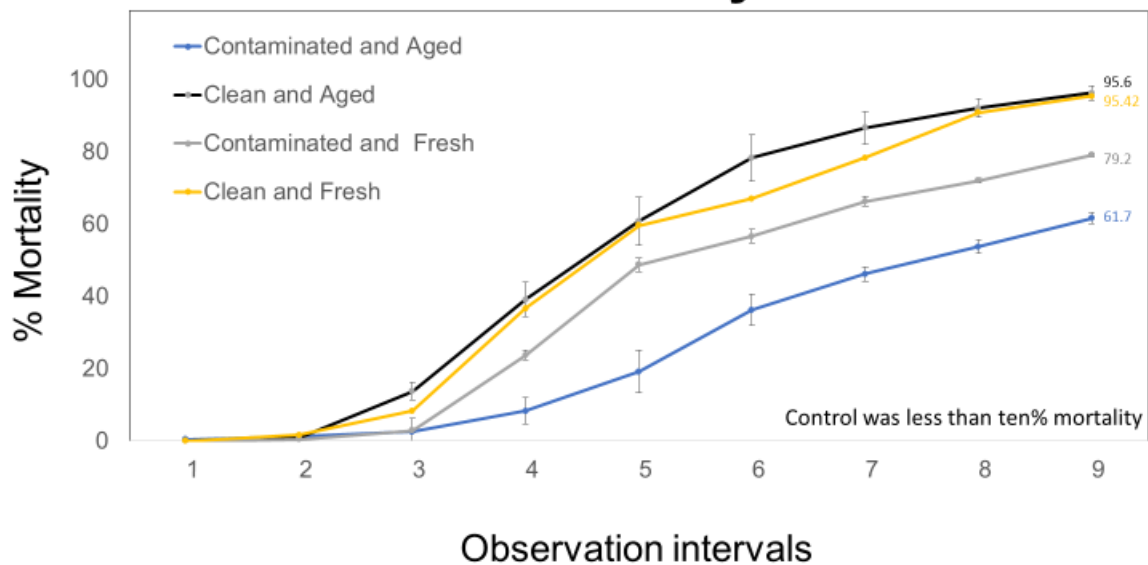
2 Month Mortality Trends



3 Month Mortality Trends



Overall Mortality Trends



In the overall trends we see a dramatic effect on mortality in the replicates that held a sanitation component. The sanitation replicates when added with aged baits showed a major decrease in cockroach mortality while aged and fresh baits with no sanitation component showed complete or nearly complete mortality after the seven-day bioassay trial.

Conclusion

Using my capstone experiment I have showed how sanitation directly effects cockroach mortality. With this experiment I have shown how scientific results can lead to the proper hypothesis, but I have also learned that sometimes we make mistakes. In generating this Bioassay, I have learned a few things that could lead to further experimentation in this field. I also now that I now can improve on this subject as well through trial and error.

Adding more replicates could have given me more defining results also figuring out how to accurately weigh the treatments with a sanitation component could have changed or even swayed my experiment in another direction.

We have also learned how important sanitation is in the control of German cockroaches.

Acknowledgements

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