Abstract

EVALUATION OF COMBINING SULFURYL FLUORIDE, PROPYLENE OXIDE & CO_2 FOR STORED PRODUCT INSECT CONTROL

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DFA has spent the past 12 years doing research to find alternatives to MB and has had promising results. Two very promising fumigates are sulfuryl fluoride and propylene oxide (PPO). ProFume™ gas fumigant (99.8% sulfuryl fluoride or SF) is now registered for use on many stored products and other commodities. Currently we are conducting a study combining these two fumigates along with CO_2. We have completed two years of a three year project titled, "Efficacy with the Combination of Sulfuryl Fluoride and Propylene Oxide as Replacement for Methyl Bromide Fumigation of Stored Food Products."

The goal of this project is to conduct laboratory research to evaluate the efficacy of combining SF and PPO on stored product insects as compared to the efficacy of each alone and the costs and other implications to the industry. Our findings for the first year showed that it was possible to combine the two fumigants as potential an alternative to MB. We have results completed for combination treatments on all stages of RFB, WB, and IMM under NAP at 26.7^{o}C for 24 hours. We found that RFB eggs are the most tolerant to the combination. A combination CT of about 45/160 (SF/PPO) achieved an LD_{50} on eggs, whereas at a CT of about 150/220 enabled an LD_{95} on eggs. The post-embryonic stages for all three insects with a CT of about 120/170 produced an LD_{50} and a CT of about 150/220 produced an LD_{95} on larvae. For the pupae stage, a CT of about

50/220 produced an LD_{50} and a CT of about 120/240 produced an LD_{95} in all three insects.

We have started both testing under vacuum as well as commodity work (raisins and almonds). Test results show that the use of 10% CO_2, in conjunction with the mix of SF/PPO, has higher lethal effects on the insects than fumigations without the CO_2. Vacuum fumigations require considerably less fumigant than fumigations at NAP. A combination CT of about 20/20 (SF/PPO) enabled an LD_{50} and CT of about 40/40 enabled an LD_{95} on eggs. RFB with a CT of about 15/15 produced an LD_{50} and a CT of about 27/27 produced an LD_{95} on larvae. At this time, only preliminary results are available for vacuum studies because insect counts are not completed.

For the third year, our objectives are to complete the vacuum work and both the commodity and field fumigations. Some low temperature studies will be conducted.