NONCHEMICAL ALTERNATIVES TO METHYL BROMIDE FOR CONTROL OF DRYWOOD TERMITES IN CALIFORNIA

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Damage caused by wood-destroying insects has an important economic effect. Nationwide, the cost of control and repair of damage by these insects nears $5 billion per year; the outlay in California approaches $1 billion per year. In California, subterranean and drywood termites are responsible for over 95% of all costs resulting from wood destroying insects; damage by drywood termites is more common in southern California. One of the standard treatments for control of drywood termites has been fumigation with methyl bromide. The public is showing increased interest in nonchemical insect control in homes. The nonchemical alternatives presently marked for control of drywood termites include excessive heat or cold, electrocution, and microwaves. With the exception of excessive heat, these nonchemical treatments are classified as "local or spot treatment" applications. We report the test results of 2 types of fumigation, or whole-structure treatments, and 4 methods marketed as alternatives to whole-structure fumigation, evaluated under conditions that simulated infestations in structures.

Termite mortality in artificially infested boards was 100% at 3 days after treatment for both fumigant gases, sulfuryl fluoride and CO_2-synergized methyl bromide. Heating the whole structure or spot-applications using microwaves resulted in 96 and 90% mortality, respectively, 3 days after treatment. Mortality levels 4 weeks after treatment increased to 98% for heat and 92% for microwaves. Spot applications of liquid nitrogen at 381.8 kg/m^3 achieved 100% mortality 3 days after treatment. However, for 122.7 and 57.3 kg/m^3, mortality levels 4 weeks after treatment were 99 and 87%, respectively. Mortality 3 days after treatment with spot applications of electricity was 44% in the first test. Four weeks after treatment drywood termite mortality increased to 81%. In a second electrocution test, using spot-application techniques infrequently used in structures, mortality levels increased to 93% at 3 days and 99% at 4 weeks after treatment. For naturally infested boards, both fumigants exceeded 99% mortality. Use of heat and microwaves resulted in 100 and 99% mortality, respectively, 4 weeks after treatment. Applications of liquid nitrogen resulted in mortality > 99.8% at 381.8 kg/m^3; however, mortality for 57.3 kg/m^3 was significantly lower (74%). Mortality levels from electrocution 4 weeks after treatment were 89 and 95%, respectively, in the 2 tests. Damage to test boards and the test building did occur. Six test boards were scorched during microwave treatment, 80% of the test boards were damaged during electrocution. Visible signs of damage to the test building were noted for whole-structure heating.