

Comparative efficacy of kempas and rubberwood dip-treated in proprietary insecticides cypermethrin and permethrin between short dipping durations under low or high humidity Malaysian H2 hazard class conditions against *Coptotermes curvignathus*

by

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Abstract

Publicly available water-borne organic agro-insecticides normally contain prescribed spray-on solution strengths for crop protection against specific insect crop pests and also termites. The objective of this study was to examine the efficacy of cypermethrin and permethrin products to protect dip-treated wood against *Coptotermes curvignathus* at the prescribed use rates meant for specific insect crop pests. This study compared dipping times (3 sec versus 60 sec) in organic water-borne insecticide products at concentrations not exceeding the prescribed spray solution strengths (prescribed for cypermethrin: 0.0055%/g; permethrin: 0.0053%/g) for termite control on kempas (*Koompassia malaccensis*) heartwood and rubberwood (*Hevea brasiliensis*) sapwood test blocks exposed to two variants [low (LH) versus high (HH) humidity] of H2 Hazard class (above-ground, protected from light, rain and flooding). Results showed that wood dip-treated for 60 sec. had higher insecticide retentions (%g/g) than that for 3 sec. although such differences were significant ($P < 0.05$) only for treated rubberwood. Untreated rubberwood blocks were destroyed at both H2 hazard class exposures (HH: mean mass loss 93.9%, mean AWP termite rating 1.2; LH: mean mass loss 91.7%, mean rating 0), while untreated kempas sustained rather severe attacks [HH: mean mass loss 39.0%, mean termite rating 5.5, LH: mean mass loss 48.2%, mean rating 5.7]. Furthermore, termiticides with prescribed or reduced concentrations regardless of dipping times and H2 hazard class situations, failed to protect rubberwood [mean mass losses $> 70\%$, with mean AWP termite ratings ≤ 3.8]. Contrasted with kempas, based on AWP ratings, the best termite control was not at the prescribed (maximum) solution strengths for these insecticides with no consistent trends between HH and LH H2 hazard classes, or dipping times [mean termite ratings of 8.7 (0.0055% cypermethrin at LH, and 3 sec; 0.00275% cypermethrin at HH and 3 sec) and rating 9.1 (0.001325% permethrin at LH and 60 sec)]. In conclusion, treated rubberwood was more susceptible to termites than treated kempas. Overall kempas treated with cypermethrin and permethrin at their best performing concentrations were quite well (but not completely) protected, implying that a higher minimum dip-treatment pesticide concentrations than that prescribed in the product labels for spray-on crop protection, would be required to prevent attack of both woods exposed to H2 hazard class situations.

Keywords: kempas, rubberwood, cypermethrin, permethrin, dip-treatment, H2 hazard class, *Coptotermes curvignathus*