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TOXICITY OF ETHANEDINITRILE (C_2N_2) TO ASIAN LONGHORNED BEETLE LARVAE

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Introduction

The Asian Longhorned Beetle (ALB) is native to parts of Asia, and is considered a serious quarantine pest because it attacks and kills many hardwood trees, such as maple, elm, horse chestnut, ash, birch, poplar and willow. ALB could significantly disrupt the forest ecosystem if it became established over a large area outside its native range. Currently, there is no known chemical or biological defence against the ALB. In all cases of incursion of ALB into the USA to date, all infested trees have been removed, chipped, and burned, at great expense.

The obvious way to reduce the quarantine threat posed by ALB is to develop reliable and effective means to disinfest wooden packing materials at the source. The Institute of Animal and Plant Quarantine of China (IAPQ) and USDA, APHIS, PPQ have been collaborating for some time on fumigant treatments for control of ALB in softwood packaging. CSIRO Entomology has recently joined this collaboration to test the efficacy of its new fumigant, ethanedinitrile (C_2N_2), which is believed to have particular potential as a quarantine treatment for green timber.

This paper reports on the initial toxicity studies undertaken in Lanzhou, China where we could obtain ALB larvae from infested timber logs (Figure 1).

Results

Table 1 shows the concentration x time value of C_2N_2 treatments over a range of temperatures. The comparable Ct product for methyl bromide at 4ºC is >600. Figure 2 shows that increasing the exposure time from 3 to 6 hr greatly improves the mortality results.

Discussion & Conclusion

These preliminary results on the efficacy of C_2N_2 to naked larvae are very encouraging. The fact that C_2N_2 can and will dissolve in water and move across the grain in timber suggests that treatment of ALB within wood will be achievable. Those studies form the next phase of the investigation.

Figure 1. Undertaking the ALB larval studies: Top left: Splitting infested poplar logs to obtain ALB larvae; Top right: Split infested poplar log with ALB larvae; and Bottom: ALB larvae for bioassay

Table 1. The C×t product (mg/L x hr) for C_2N_2 control of naked larvae of ALB.

Temperature (^oC)	C_2N_2 Exposure Period	
	3 hours	6 hours
4.4	251	293
10.0	192	192
15.6	106	115
21.1	68	58

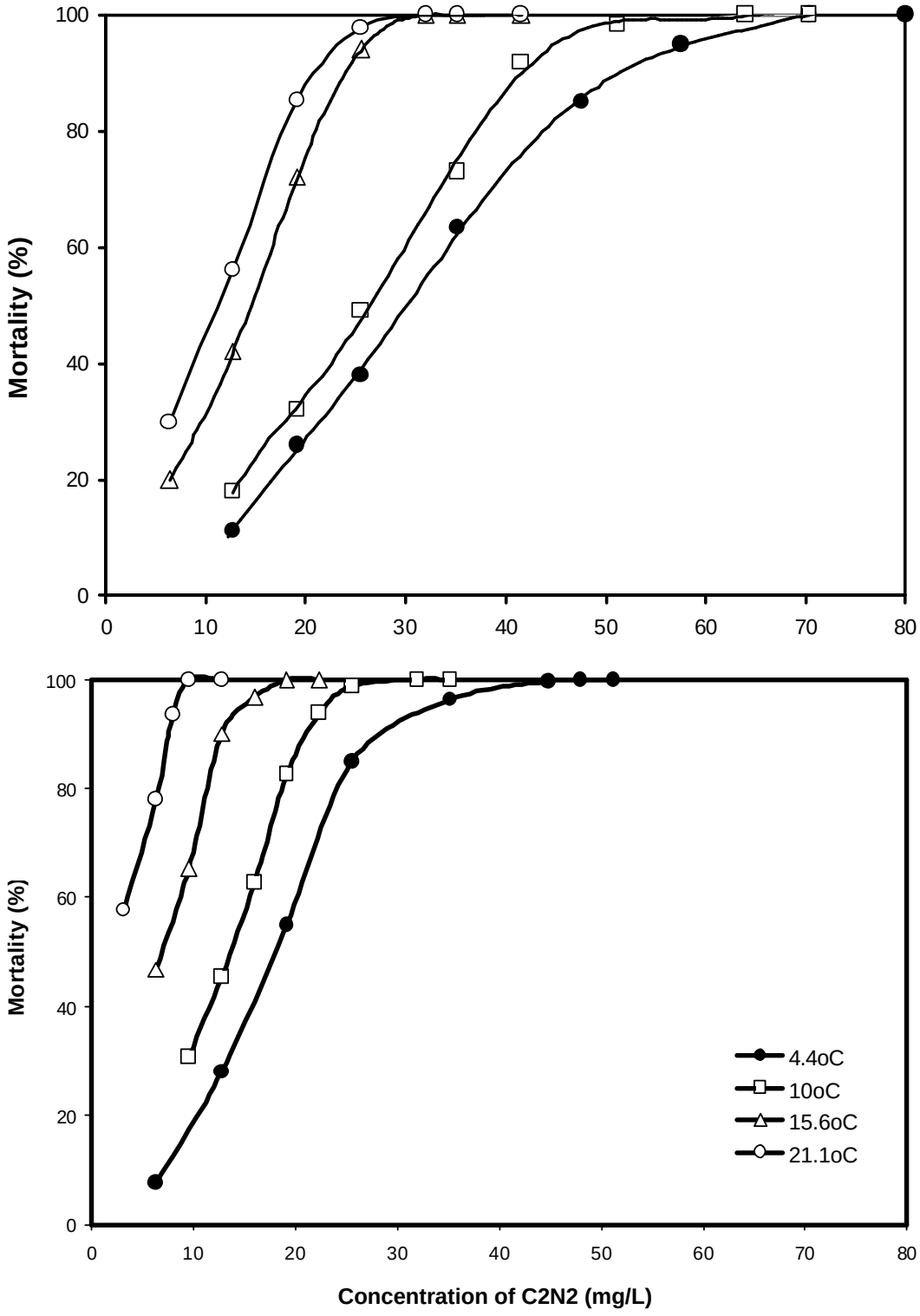

Figure 2. Toxicity of C_2N_2 to ALB larvae for 3 hours exposure (top) and 6 hours exposure (bottom) at different temperature.