EFFICACY OF ETHANEDINITRILE TO WOOD RELATING PESTS: JAPANESE TERMITE AND YELLOW MINUTE BARK BEETLES

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Introduction

New Methyl bromide (MeBr) alternatives, ethanedinitrile (EDN) was patented and initially investigated in CSIRO since 1995. In Korea, Uses of MeBr for quarantine purpose especially controlling foreign wood-destroying pest are relatively higher than other counties; about 79% of total MeBr uses in Korea. For the MB replacement in logs and wood related products, we previously have shown EDN efficacies to various timber and wood relating pests: *Reticulitermes speratus*(Japanese termite, JT), *Tomicus piniperda*(Pine bark beetles)*, Hyphanria cunea, Monochamus alternates*(Japanese pine sawyer) and *Bursaphelenchus xylophilus*(Pine wood nematode). This study is reports results of the two semi-field fumigation on EDN to Japanese termites and Yellow minute bark beetles.

Materials and Methods

Materials. EDN (Ethandinitrile, purity=97.3%) was supplied from Linde(former BOC Australia). Logs infested *Reticulitermes speratus*(Japanese termite, JT), *and Crypahlus fulvus*(Yellow minute bark beetles, YMBB) were collected at Andong and Jinju in Republic Korea, respectively. Pine logs for loading purpose was sawn from Korean red pine (*Pinus koraiensis*). Randomly 10 samples of pine tree was measured their moisture contents by oven drying method.

Fumigation trials of metal frame covered with PVC-tarpaulin. Two field fumigation trials were conducted at QIA, Suwon, Kyungki Province, Korea.

Fumigation chambers(100 by 100 by 100 cm) were constructed of metal frame and covered with PVC-tarpaulin. Calculated gas weight (g/m3) of EDN injected into the chambers. During the fumigations, the air temperature in each chamber was recorded using Thermo Recorder (TR-71U). After fumigation for 6 and 24hr, the chambers were aerated for 24hr.

Measurement of EDN concentration. The concentration of EDN in fumigated chamber was trapped the tedlar bags and measured by gas chromatography. Analyses of concentration of gas performed with FID fitted with an DB-WAX Column. The GC oven temperature was 150℃. Injector and detector temperature was 200℃ and 200℃, respectively. To obtain a fumigant concentration in the spiked standard and trapped bag, calculation of the dose or volume of EDN at the experimental ambient temperature and pressure was used the following equation (Ren et al. 2006).

Bioassays of infested logs. Both JT and YMBB bioassay, each fumigated logs was carefully split and were counted. Non fumigated woods were used for control mortality as same methods.

Results

Efficacies of EDN to JT and YMBB

The EDN was found to be highly effective to the both wood pest even when applied at 50g/m3 for 6hr at relatively high temperature conditions (Table1). Although we exactly didn't get comparison data previous two field trials at low temperature (Ave. 4.4 and 6.1), the effectiveness of EDN is relatively much higher than previous cold conditions. EDN show the potential for the logs fumigations to control infested wood relating pest.

Table 1. Efficacies of EDN to JT and YMBB(22℃±5)

Fumigant	Dose (g/m3)	Time (hr)	m. c. (%)	f.r. (%)	Target pest & Developmental stages (Dead No./Total No.)		
					R. speratus	*C. fulvus*	
					Nymph+Adult	Larvae	Adult
EDN	50	24	21.1	40	21/21	24/24	47/47
EDN	50	24	54.5	40	37/37	17/17	15/15
EDN	50	24	54.5	80	56/56	23/23	31/31
MB	48	24	21.1	40	-	22/22	83/83

MB	48	24	54.5	40	-	55/55	31/31
EDN	70	6	21.1	40	33/33	36/36	42/42
EDN	70	6	54.5	40	38/38	41/41	218/218
EDN	50	6	21.1	40	43/43	55/55	44/44
EDN	50	6	54.5	40	29/29	32/32	71/71
EDN	50	6	54.5	80	56/56	41/41	41/41

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