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In-transit fumigation of shipping containers with ethyl formate + nitrogen during full travel on road and on sea

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ABSTRACT

The use of shipping containers for cargo transportation has the potential to transport insect pests from infested to non-infested areas. Therefore, fumigation is required as an appropriate biosecurity measure to exterminate these pests. In-transit fumigation trials were conducted in four 6.1 m (20 ft) shipping containers during a two-day journey. Ethyl formate (EF) (90 g/m³) was purged with nitrogen (EF+N₂) into the containers. Ethyl formate concentration inside containers and the surrounding environment were monitored at timed intervals throughout the journey on road and sea. Fumigation achieved sufficient concentration × time (Ct) products in the containers during the journey, which exterminated all stages of most common insect pests. Levels of EF in the environment between 1-15 m downwind from the containers and driver's cabin were less than 0.5 ppm at each of the timed intervals below 100 ppm of EF Threshold Limit Value (TLV). Ethyl formate concentrations inside containers and the surrounding environment on the barge were monitored at timed intervals throughout the overnight voyage. This research had also demonstrated that there was no detectable risk to the public, crew members on the barge or workers on discharging area throughout the journey. In addition, all tested containers were ready to be opened and unloaded after 5-10 min aeration or without aeration upon arrival at discharging area.

Keywords: In-transit fumigation, Insect pest control, Fumigant, Ethyl formate, Worker safety, Environmental safety