ETHANEDINITRILE: RATIONALE FOR THE DEVELOPMENT OF EFFICACY DATA FOR A POTENTIAL PHYTOSANITARY FUMIGANT FOR NEW ZEALAND EXPORT LOGS

Ian R. Gear[1] and Jack Armstrong[2]

1. The Stakeholders in Methyl Bromide Reduction Inc. (STIMBR)
2. Quarantine Scientific Limited

Corresponding author: *ian@ingearglobal.com.nz*

Abstract A comprehensive review of potential alternatives to methyl bromide and phosphine for export logs confirmed that ethanedinitrile (EDN) was the only chemical alternative that should be studied further. A techno-economic study was completed to inform a decision on whether to invest in research to develop efficacy data for EDN as a phytosanitary treatment for New Zealand export logs. The study confirmed that EDN may be a potential alternative to existing fumigants and noted that there are no significant technical issues to prevent STIMBR from pursuing EDN as an alternative export log phytosanitary treatment.

EDN is formed by the chemical oxidation of hydrogen cyanide (HCN) in a catalytic system in the presence of an organic solvent and water. EDN is stable as both a liquid and a gas (fumigant). In the environment its volatile nature causes EDN to evaporate from water and soil and disperse. EDN biodegrades in water, sediment and soil to form ammonia and carbon mon- and dioxides.

EDN is neither an ozone depleting substance nor is it a green-house gas.

It has been shown that EDN does not reconvert to HCN in the head space during fumigation. EDN is responsible for insect mortality in fumigation. When compared with many industrial and commercial chemicals used in New Zealand, such as methyl bromide, EDN is not significantly more toxic and does not present any special risks.

Research undertaken by Plant and Food Research (PFR) for STIMBR confirmed that EDN can be used as a fumigant for logs and indicated that it will be efficacious against New Zealand forest insects. Further research is needed to develop life stage mortality tables for all target forest insect species to provide data for Ministry for Primary Industry market access negotiations and to develop an efficacious fumigation schedule for industry use.

PFR recently showed that EDN desorption from logs after aeration was virtually undetectable after 1.5 h. Further study is needed to confirm that the release of desorbed EDN is not an issue. Larger scale fumigation studies are needed to confirm the PFR results. If emissions are unacceptably high, emissions management systems to minimise dispersion of desorbed EDN will be needed.

Until the dispersal research has been completed and any controls required by the EPA have been confirmed, it is difficult to calculate a definitive cost for EDN use. Modelling undertaken within the study made realistic assumptions about rate and application methods and determined that EDN has the potential to be competitive with methyl bromide.

The techno-economic study identified that community interest and concerns associated with a new fumigant can be managed effectively if consistent and transparent messaging is provided about the product and its intended use.

STIMBR is preparing to commence the development of efficacy data for EDN.