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CHALLENGES OF NOVEL FUMIGANTS MONITORING – FIELD EQUIPMENT TO MEASURE ENVIRONMENTAL AND OH&S LEVELS OF VAPORMATE™

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ABSTRACT

Without the ability to monitor and measure levels of novel fumigants in the atmosphere and commodity, the fumigant development will come to a halt. We have examined a range of available hand held or portable instruments to measure environmental and OH&S levels of a new grain fumigant formulation: a cylinderised mixture of liquid ethyl formate in liquid CO₂ (16.7% w/w) called VAPORMATE™. ToxiRAE, manufactured by RAE Systems Inc, is a programmable pocket-size Photo-Ionization Detector. With its standard 10.6 eV lamp, the PID has low sensitivity to ethyl formate vapours but it is not affected by the presence of high CO₂. An optional 11.7 eV lamp is available but it is extremely sensitive to moisture and very expensive. MiniWarn, manufactured by Dräger, is a hand held multi-gas monitor with up to four different sensors. The electrochemical sensor for methane is sensitive to ethyl formate at fumigation levels, but it is also sensitive to CO₂. Scrubbing of CO₂ with soda lime based scrubbers will remove ethyl formate as well. This instrument can monitor levels of oxygen and OH&S (occupational hazard and safety) levels of CO₂ with adequate sensing. FI-21, manufactured by Riken Keiki, is a portable optical interferometer. It is sensitive to fumigation levels of ethyl formate but it is also affected by CO₂, with the same problems of CO₂ and ethyl formate scrubbing as the MiniWarn. Miran® SapphIRe™ as an infrared-based portable instrument, developed by Thermo Environmental Instruments for measurement of ambient air in the workplace environment. It can measure environmental and OH & S levels of ethyl formate without interference by CO₂, but the manufacturer does not provide ethyl formate as a part of the instrument's standard gas library.