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Evaluation of railcar fumigations during transportation

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ABSTRACT

Grain and grain-based products in railcars are often fumigated with phosphine during transportation but monitoring gas concentrations during transport can be challenging and typically no information is available on gas concentrations and exposure times obtained during transportation. The rationale for these treatments is typically as insurance to make sure that any insects in the cars or the product at the time of loading are eliminated or to prevent infestation during transportation. However, how effective these fumigations are can be impacted by many factors including the type of railcar, rail car condition, temperature, time spent moving, rate of movement, and trip duration. Rail transportation has restrictions that limit the use of conventional methods of gas monitoring, but new wireless phosphine monitoring devices that can be placed inside structures during treatments and that also have the ability to log and store gas concentration readings offer a new opportunity to understand fumigations during transport. We worked with collaborators to place Centaur PH_3 phosphine gas sensors into railcars after loading, but prior to fumigation and transportation. After railcars arrived at their destination the sensors were shipped back to the lab and the data were downloaded and analyzed. Results from monitoring multiple positions within a car, multiple cars and trips, and different car types will be presented. Implications for the use of this type of fumigation, ways to potentially improve the consistency and efficacy, and an evaluation of the use of these monitoring devices will be discussed.

Keywords: Phosphine, Fumigation, Railcar, Transportation, Monitoring