Environmental fate data characterizing the biodegradation potential of dsRNAs in environmental matrices will be a critical component of the exposure assessment required for a comprehensive and rigorous environmental risk assessment of RNA-based agricultural products. Furthermore, the introduction of RNA-based processes for agricultural products requiring environmental fate studies necessitates the development of novel analytical methods to determine the biodegradation potential of dsRNAs in the environment. Therefore, we have developed three complimentary techniques to assess the nature and rate of degradation in soil of dsRNA from a biotechnology-derived in planta RNA-based insect-protected corn product. These techniques include a QuantiGene® assay to quantify the amount of dsRNA, northern blot to characterize the nature of the degradation of the dsRNA exposed to soil, and insect bioassay to measure functional toxicity. Results from the QuantiGene® assay and northern blots will be presented indicating that soil samples dosed with a dsRNA alone or with a dsRNA-corn tissue mixture demonstrate a loss of the parent dsRNA over time. Furthermore, results from insect bioassay indicate a corresponding time-dependent loss in biological activity. Results from complimentary methods support a lack of persistence of dsRNA in the soil environment and will be broadly useful for the exposure assessment needed to appropriately assess the environmental risk of RNA-based agricultural products.

Keywords: environmental fate, environmental risk assessment, RNA, soil